The AVIATION INDUSTRY

THE CURTIS PUBLISHING COMPANY
PHILADELPHIA, PENNSYLVANIA

THE
UNIVERSITY LIBRARY

Washington and Lee University

WITHDRAWN
James G. Leyburn Library

Digitized by the Internet Archive
in 2026

https://archive.org/details/aviationindustry0000vari

AEROPLANE OF THE CURTIS PUBLISHING COMPANY USED IN AVIATION STUDY

THE AVIATION INDUSTRY

A Study of Underlying Trends

by

Division of Commercial Research

The Advertising Department
THE CURTIS PUBLISHING COMPANY
PHILADELPHIA
1930

THE UNIVERSITY LIBRARY
WASHINGTON & LEE UNIVERSITY
LEXINGTON, VA. 24450

TL
552
.C8

JUL 12 1983

6/7/83 aj

COPYRIGHT, 1930
BY
THE CURTIS PUBLISHING COMPANY
Printed in U. S. A.

TABLE OF CONTENTS

Chapter		*Page*
	Preliminary Statement	7
I	Potential Markets	11
II	False Analogies to the Automobile Industry	15
III	Necessity for Volume	19
IV	1930 a Crucial Year	24
V	The Greatest Sales Danger	27
VI	Who Will Dominate the Aviation Industry?	31
VII	Outlets for Planes	34
VIII	Dealers, Schools and Service	37
IX	Turnover of Generations	43
X	Conditions for Safe Flying	45
XI	Weather	47
XII	Coöperation Between Railroads and Air Transport	52
XIII	Speed versus Comfort	54
XIV	Rate	61
XV	Types of Heavier-Than-Air Craft	67
XVI	Types of Lighter-Than-Air Craft	77
XVII	Parts and Accessories	85
XVIII	Air Express	89
XIX	Export	95
XX	Airports	99
XXI	Knocking Competitive Products	105
XXII	Assistance Rendered by the Government	107

TABLE OF CONTENTS—*(Continued)*

Chapter		*Page*
XXIII	Localization of Manufacture	110
XXIV	Used Planes	113
XXV	Insurance	115
XXVI	Photography, Dusting and Other Air Services	119
XXVII	Women and Aviation	121
XXVIII	Farmers and Aviation	123
XXIX	Publicity	125
XXX	Advertising Opportunities	127
XXXI	Vacations by Air	133
XXXII	Curtis Publications and Aviation	135
XXXIII	Future of the Industry	143

Appendix Questionnaire

A	Preliminary Statement	145
B	What Type of Plane is Wanted	147
C	Factors of Importance in Choosing a Plane	153
D	Influence of Style and Appearance	156
E	Status of Those Answering	157
F	Occupations	161
G	Flying and Maintenance by Owners	163
H	Miscellaneous Facts Concerning Owners	167
I	Student Ownership	170
J	Connections of Students with Aviation Industry	171
K	Use of Plane	175

PRELIMINARY STATEMENT

THE aviation industry is changing so rapidly that the gathering of statistics was found to be futile. The figures changed as they were gathered and furthermore it was quickly seen that a picture of the industry as of the present date, even if it could be portrayed accurately, could be of little value, for the vision of the industry was forward. An account of the current conditions of airports seemed equally futile, for almost every airport had plans for improvements which were either definitely projected or under construction. A second visit to an airport usually showed that marked changes had taken place since the visit of a few weeks before.

Underlying Trends

It seemed to us clear, therefore, that whatever contribution we might be able to make to aviation would need to take the form of a study of the underlying trends and the inherent peculiarities of the industry. Hence this report confines itself to impressions of those more fundamental tendencies which seem to us likely to influence the development of the industry over a considerable period of time. These impressions are expressed as personal opinions rather than as purporting to summarize the current views of the industry. Opinions expressed on many phases of the industry varied widely, and while our impressions were gained largely by interviews with leaders in aviation, they also in part originate from a background obtained in the study of many other industries.

Scope of Survey

In July, 1929, The Curtis Publishing Company bought a trimotored plane, fitted it as a flying office and engaged as pilot Lieutenant A. W. Gorton of the United States Navy, who later attached a plane to the Los Angeles at the Cleveland air meet. With the plane, representatives of the Commercial Research Division flew 207 hours—about 20,387 miles—entering every section of the country and interviewing leading manufacturers, distributors, airport managers and other leaders in aviation. Acknowledgment is here made of

the cordial reception and courteous treatment everywhere received. Interviews everywhere were characterized by candid statements and often confidential figures were voluntarily given. Without this coöperation on the part of leaders in the industry, this report would not have been possible.

Other Studies

During the past nineteen years, the Commercial Research Division has made similar nation-wide studies of the market potential and sales methods of Automobiles, Tractors, Department Store Lines, Foods, Electrical Appliances, Radio, Machine Tools and a number of other industries. Some of these reports were written long enough ago so that one may test in retrospect the accuracy of the forward look there expressed. These reports have been of value in helping to distinguish between that which is fundamental and that which may prove ephemeral.

A rereading of these reports convinces us that industries develop in accordance with economic law, that little variation occurs through chance and that an industry quite inevitably arrives where its basic tendencies take it. If this book in any way helps to direct thought toward those fundamentals which will shape the future of aviation, it will have fulfilled its purpose.

Comparison With Automobile Study

Since it is customary within the industry to compare the airplane industry with the automobile industry, we have, in several of the chapters of this report, referred to the report which was made by the Division of Commercial Research in 1914 on the Automobile Industry after a year of study covering all sections of the country and all phases of the industry, and to an address based on that report made in 1915 by the manager of the Division of Commercial Research and printed for distribution by The Curtis Publishing Company.

For a few chapters on which our interviews indicated that divergent views are held in the industry, one or two typical expressions of opinion on each side are appended to the chapters. There is appended to the report the results of a questionnaire sent in August and October, 1929, to all owners of planes and to 1,000 students. Tabulations are presented for commercial owners, non-commercial owners and students, and the appendix is illustrated by charts based on commercial and non-commercial owners combined.

Acknowledgment is made of the valuable assistance rendered on this report by Fred Bremier and J. A. Emery, of the Division of Commercial Research, by

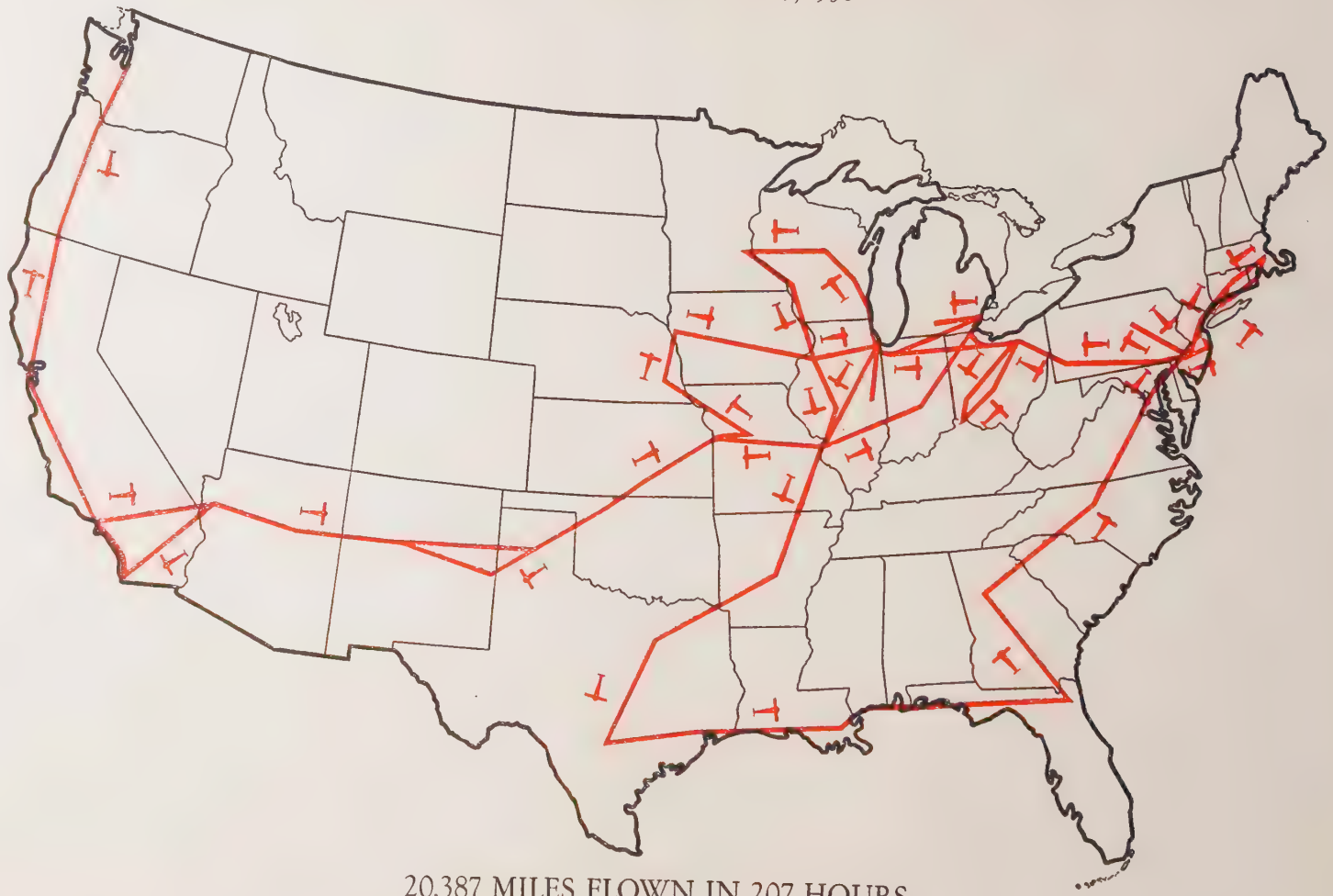
A. W. Gorton, pilot of the Curtis plane, and by the office staff of the Division of Commercial Research.

Acknowledgment is also made of the assistance rendered by the Aeronautical Chamber of Commerce of America in permitting use in this book of figures from their Aircraft Year Book 1930, further acknowledgment of which is made on the charts on which their figures appear.

Charles Coolidge Parlin, *Manager*
Division of Commercial Research
The Advertising Department
The Curtis Publishing Company
1930

ROUTE OF THE CURTIS PLANE IN AVIATION STUDY

JULY 11, 1929-JANUARY 15, 1930



20,387 MILES FLOWN IN 207 HOURS

CHAPTER I

POTENTIAL MARKETS

WE HAVE confidence that the aviation industry will develop into a large and sound industry. This confidence is based on two facts. First, the idea of air travel is sound. Air travel is certainly the quickest, we believe can be made the most comfortable and, ultimately, we think probably will be the least expensive method of long-distance travel. Second, the industry in all its phases is manned by young men with enthusiasm and with faith in the future of the industry.

Enthusiastic service appears to be more true of aviation than of any other form of transportation and also more true of aviation than of any other industry we have studied, the nearest approach being the automobile industry in its early days. It is upon our confidence in the power of youth, inspired by faith and enthusiasm to accomplish much when applied to a sound proposition, that we base our belief on a sound and rapid development of the airplane industry.

It seems to us likely that ultimately all first-class mail will be carried by airplane wherever an airplane can speed delivery; that a majority of "Pullman class" day travel for distances in excess of 100 miles will be by air; that air package transport may exceed first-class mail and passengers combined.

We believe a day will come when over the main airways connecting large cities, frequent planes with capacity for twenty or more passengers will pass on regular schedules well loaded with passengers, mail and express; that from minor cities along these routes will come smaller planes also well patronized, acting as feeders for the trunk lines; that neighboring major cities will have intercommunication by air approaching street-car frequency, so that if one plane is crowded, no matter—another will start very soon; that neighboring minor cities will have intercommunication by smaller planes which in many cases may be able to secure sufficient patronage for hourly service; that planes from minor cities to major ones for shopping, for afternoon matinées, for evening entertainments, will become a well-patronized commuting service; that many business men with pilot chauffeurs will commute by plane from estates to their city offices; that air service twice weekly or more frequently will carry

passengers, mail and express to Europe and to the Orient; that frequent air service will connect the United States with Hawaii, Philippine Islands and all of its possessions; that the greater part of first-class mail, both over land and over water, will be carried in the air and that air express will be one of the most profitable parts of the air service.

Length of Time Required

How long it will take for the consummation of this program will depend on three factors:

(1) The support given by government agencies; by the Federal Government in mail contracts, extension of weather bureau service, radio and route lighting; by local governments in developing suitable airports and providing rapid communication to and from the airports.

Since any future war is likely to be fought primarily in the air, the government has abundant reason to foster the aviation industry in the interest of national defense. The existence of large and well-equipped factories for the production of automotive equipment was one of the major factors in America's contribution to the World War. If the United States ever becomes involved in another war, American airplane factories may be the determining factor.

(2) The consummation of this program will depend upon the willingness of capital to make consequential investments in the industry, forgoing immediate profits in a belief that future returns will justify immediate sacrifice.

(3) The consummation of this program will also depend upon the amount and character of advertising put behind the industry. This, in a sense, is the basic factor, for advertising which will educate the public to use aviation facilities will at the same time do much to crystallize sentiment favorable to governmental support of the industry and will be helpful in maintaining confidence of capital during a period of small dividends.

If the industry receives good support along the three lines outlined above, it seems to us reasonable to believe that much progress toward the consummation of the program will be made in five years; that within ten years the complete realization of the program will be recognized as attainable at an early date and that within fifteen years the full program may be realized.

Privately Owned Planes

A considerable number of individuals are using privately owned planes for sport and for business, and this number, we believe, will steadily increase.

Many men find a joy and exhilaration in flying. Those who own planes find much possible in week-end trips for pleasure and in quick trips to distant points for business appointments which otherwise would not be practicable.

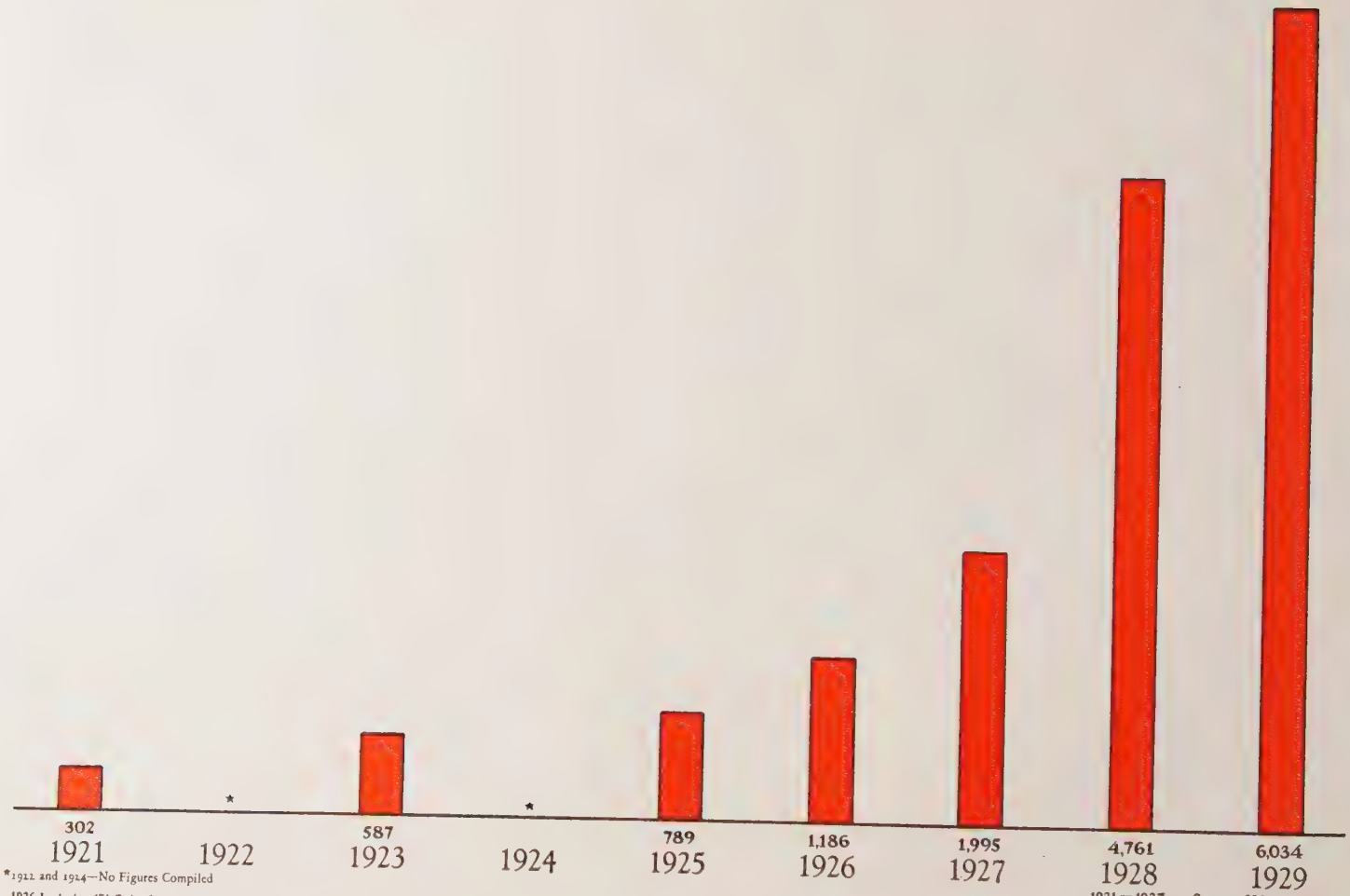
In some places, flying has been stimulated by flying clubs. We believe that even under present conditions there will be a steady growth of the market for individually owned planes, but so long as the price of planes remains near the 1929 level and the cost of learning to fly is several hundred dollars, the market for individually owned planes for pleasure purposes is limited. Those who have the price to buy a plane and pay for instruction, for the most part, do not desire to fly, while those who wish to fly cannot afford the present cost.

Yet in spite of these difficulties, we believe the market for individually owned planes will continue to grow. The extent to which planes will be owned by individuals will depend, we believe, in addition to factors outlined above, very largely upon mechanical improvements, materially increasing the safety factor and materially reducing space required for landing and take-off and also materially reducing time and expense required for instruction.

If through the autogiro or some other principle, it comes about within the next five years that planes when they lose speed will settle to the ground without damage, if they can be taken safely into and out of a four-acre lot and if a person with average mechanical training can in a short time at small expense learn to fly a plane safely and if, furthermore, planes are sold at prices comparable with automobile prices, considering number of passengers and grade of construction, a total within ten years of 250,000 privately owned and operated planes—one to every 100 families—seems to us quite possible. It does not seem to us probable that airplanes will ever be so universally owned as automobiles, but it does seem to us not impossible that if the developments mentioned materialize, within fifteen years there should be 1,000,000 privately owned planes in operation with an annual market of 250,000.

It seems to us probable that acceptance of air transport will precede the development of a quantity market for individually owned planes. Of those who this year travel by air, some, by next year or the year after, will desire to own planes. Hence a marked increase in patronage of airplane lines in one year is likely to be followed within two years by substantial increases in number of planes sold for private use. We see no reason to expect a large increase this year in demand for individually owned planes. If, however, a good step forward be taken this year in travel by air, it seems to us possible that materially increased markets for individually owned planes may result in 1931 and 1932.

PRODUCTION—NUMBER OF PLANES



*1922 and 1924—No Figures Compiled

1926 Includes 171 Rebuilt and Reassembled Airplanes

1921 — 1927 — Census of Manufactures

1928 — 1929 — From Aircraft Year Book for 1930, Published by Aeronautical Chamber of Commerce of America, Inc.

CHAPTER II

FALSE ANALOGIES TO THE AUTOMOBILE INDUSTRY

MUCH confusion in popular thought has come about through believing that the aviation industry in all essential respects closely parallels the automobile industry. It is true that in many sales and advertising problems there is a close analogy between the two industries; on the other hand, in creation of markets and in methods of early financing, the industries present marked contrasts.

Fundamental Markets

In a report on the Automotive industry written in 1914, we stated: "For four thousand years the demand for automobiles was being created. Every man, woman and child has always wanted the best means of individual rapid transportation. So long as the horse furnished that best means, he ruled supreme. As soon as a really efficient motor car was produced, that moment a universal desire for its possession came into existence."

But not every human being desires to fly; on the contrary, while most human beings have probably at some time in a vague way wished they could challenge the sky like the birds, few have felt any instinctive urge to entrust themselves to any contrivance which would lift them off terra firma, and with most human beings, the older they grow the more convinced they have become that they do well to stay on the ground.

An automobile market of universal proportions sat eagerly waiting for an efficient motored vehicle. To develop a market for airplane travel requires education—instinctive fear must be overcome, reason and familiarity with the thought of being off the ground must triumph over racial heritage. Hence, the airplane market cannot be expected to leap to giant proportions in a year. Time and education will be required to develop a market and to determine what its ultimate potentialities are.

In the automobile industry, demand from the start exceeded and long kept ahead of supply and while the individual manufacturer needed advertising and sales efforts to win and hold for himself a position in the industry, he did not have to concern himself about potential markets for motor vehicles in general. But in the airplane industry there is today need for the creation of fundamental markets as well as for competition for the business that already exists—in other words, the sales and advertising requirement placed on the airplane industry is much greater than that originally placed on the automobile builder—it is to precede and build volume, not merely to follow as a harvester of already grown crops.

Financing of Automobile Industry

In method of financing a new industry, aviation and the automobile industry present a marked contrast.

The first chapter of our Automobile Report of 1914 was entitled "Manufacture Without Capital" and the method of financing was thus described: "In the beginning, people with real capital hesitated to take up this new and uncertain industry, and it was left largely to the exploitation of those without substantial resources. The method of manufacturing automobiles without capital was as follows: A manufacturer who could obtain control of $25,000 hired a designer, got a picture of a car and advertised to supply the market. Consumers were clamoring for cars, paying a $250 bonus merely for the privilege of standing in line to obtain delivery for a favorite car. Dealers knew they could dispose of all the cars they could get and hastened to place orders accompanied by a $100 deposit on each car ordered.

"The manufacturer hoped to build 1,000 cars, but he accepted deposit money for 3,000 cars, partly to allow for shrinkage in deliveries, chiefly to get capital, for $100 per car on an extra 2,000 cars meant $200,000 and this would be very useful. If the manufacturer succeeded in getting dealer deposits on his 3,000 cars, he found himself in control of $300,000, which he deposited as working capital in a bank. By this deposit and a display of his orders for 3,000 cars, he established a line of credit and with this bank rating and a further display of his 3,000 orders, he established a further line of credits with parts manufacturers, placed orders on long-time payments and proceeded to assemble cars.

"If he was able to obtain his parts according to schedule, all went well; for as soon as a car was assembled, it could be loaded on a flat car, a sight draft attached to the bill of lading and discounted at the bank. . . . When such financing was not uncommon, it was but natural that men with real capital hesitated to enter the competition. As one capitalist, who looked the matter

Commerce 629.17 C979a

up with interest and then abandoned the project, explained, 'I had so much more capital than all the others in the game that I thought I had better stay out and keep it.'

"This early lack of capital was not wholly without compensation, for one manufacturer declared that if he had started with $100,000 he would have failed. The fact that he had but $25,000 and had to strain every nerve to make ends meet, he said, enabled him to succeed. Thus it happened that while many companies failed, others lived through their early vicissitudes and accumulated enough out of their profits to establish themselves on a sound basis."

Financing of Aviation Industry

In the aviation industry, on the other hand, the accomplishment of Lindbergh and other spectacular achievements fired the imagination of all America to the possibilities of the industry long before a personal determination to fly had been created. Then, too, the mistake which financiers and the investing public had made in refusing to help the infant automobile industry and the amazing fortunes accumulated by some who had had faith furnished a strong urge to be in on this new industry—a new motor industry, possibly, in the flights of imagination, comparable in size to the automobile industry.

The failures and money losses in the automobile industry were forgotten, the rich rewards of the successful dazzled the eyes. Then, too, the automobile industry started in a period when the general public put its savings into mortgages or bonds; they had not begun to dare the risks in order to try for the rewards of America's industrial growth. The aviation industry started when the buying of common stocks was the vogue of investors, both small and large.

So into the new industry money came in ample quantities. Planes could be built in advance of demand, and a whole industry was established with little realization of the necessity of building markets and with not much provision for doing anything toward creating decision on the part of the public to fly in person instead of standing on the ground and applauding.

The break in the stock market in the fall of 1929 materially changed the financing outlook for aviation. The general public, for the moment at least, became wary of common stocks, especially of stocks of companies which had not had a considerable period of consistent earnings. Financial houses, finding that public demand for unproved stocks had ceased, became less ready to extend services to new concerns, and the industry passed from a period in which money came perhaps too freely for sound development to a period where it may become difficult to get the amounts its proper development requires.

The tightening of the money market was not, however, an unmixed evil to the industry. With easy money, firms were being encouraged to start which had no real chance to succeed. The elimination of such concerns sooner or later was inevitable and tight money will hasten the narrowing of the field to those who can demonstrate sufficient merit to win financial support. It will be unfortunate for the nation as well as for individuals if in the reaction concerns with promise of ultimate success are refused the financial support necessary to carry their program through to accomplishment.

The Aviation Industry is Sound

It is important that sufficient financial support be given to the aviation industry to enable it to develop. The aviation industry is sound, as stated in the preceding chapter, for the idea of flying is sound and the industry is manned with a young and enthusiastic personnel. A great industry is in the making. It needs time, it needs financial backing and it needs to attract more men of seasoned business and sales experience. Concerns whose product, personnel and sales programs appear to presage success deserve support, for those who succeed in the aviation industry will, we believe, be well rewarded.

CHAPTER III

NECESSITY FOR VOLUME

COMMERCIAL aviation necessitates a very consequential investment. First of all, there must be airports. An airport calls for a considerable tract of level, well-drained land conveniently located and equipped with lighting systems, runways and hangars. The cost of airports varies greatly according to the price paid for land and the extent of equipment, but a well-located and well-equipped airport in a city of 100,000 population is likely to cost $1,000,000 or more.

Since there are approximately 340 cities with population of over 25,000, most of which should be provided with one or more good airports, and since many minor cities should have serviceable airports, the initial cost for essential airports is large.

In the second place, there needs to be lighting of main routes, a material extension of weather bureau reporting and radio communicating stations so that planes can travel in any section of the country with timely warning of bad weather conditions and with contact by radio to assist landing in fog.

In the third place, a personnel must be maintained to keep airports and other aviation services available night and day at all seasons of the year.

In the fourth place, there must be factories with considerable investment not only in buildings, equipment and executive overhead, but also in mechanical development work.

In the fifth place, there must be sales distributive agencies with buildings, equipment and personnel.

In the sixth place, there must be schools of instruction with equipment and well-trained teachers.

So long as this expense must be charged against a small volume of air traffic, it will render prices prohibitive and strangle the industry. Only as these charges can be spread over a large volume can returns on investment be expected. At present, volume is too small to make the aviation industry profitable and there is a vicious circle of small volume and high prices. Volume is small partly because prices are high, and prices are high because volume is small.

How to Get Volume

The problem of the industry is how to get from where it is to where it seems possible to be, in the quickest time and with the least expense. The problem presents many difficulties, but we believe that fundamentally the answer must be sought along two lines:

(1) Get prices down.

(2) Develop consumer patronage by advertising.

A transport company can furnish many arguments why it should not reduce its prices. The cost of planes is high—the public is fickle-minded and planes purchased this year may have to be abandoned before they cease to be airworthy. The ground service and general overhead expenses are considerable. Besides, it may be argued, air travel is worth the extra charge—it is quicker, it offers a novel experience, it is a more pleasant mode of travel, it is, it is argued, worth a charge of two or three times that of train plus Pullman.

But the facts are that those who have the means to pay excess fares for personal transportation, for the most part, belong to a generation which does not choose to fly, while the generation which is eager to fly needs to count its pennies and will not spend for an air trip twice as much money as a rail trip costs.

A large number of young men travel on expense account and will not pay more than they can charge to their accounts. Many women ride in the day trains. They have too many other uses for their money to be willing to travel by air at twice the cost.

Is a Volume Market Obtainable?

But if air transport rates were made comparable with rail plus Pullman, would a volume market be obtained? We believe that without a deterrent rate differential, a consequential market for airplane travel can be developed rapidly through advertising.

Fear will prevent some people, especially people of middle age or past, from becoming air travelers. But there remains a sufficient number who will not be deterred by fear to make a very satisfactory market if they are sold on the joy of traveling by air. Some people will be deterred by air sickness—these again can be eliminated from the potential market and still leave plenty of people to furnish satisfactory patronage for air lines.

Women, we believe, are not more afraid to take to the air than men. They frequently object to their husbands and sons taking air trips, but many of them have little hesitation about going themselves. Some mothers of minor

children feel it a duty to take no avoidable risk, but unmarried women employed in schools and industry—in themselves a great vacation travel market—can be sold in consequential numbers, we believe, to a preference for air transportation.

Women have less knowledge of mechanical details and of the many things which might go wrong with the machinery. If they have confidence in a transport company, they accept their machines and pilots without reservation and proceed to enjoy the trip. They have, however, too many demands on their allowances to pay excess to travel by air. Besides, some other things need to be done to make air travel pleasing to them, as discussed in the chapter on Women and Aviation.

Losing Money

The argument against reducing prices is that money is being lost at present prices, and at rates comparable with rail rates, a profit would not be shown even if a plane averaged somewhere near to capacity.

One answer to that argument is that if money must be lost anyway, it had better be lost carrying people and thus building a market for the future than by running empty planes. Nothing succeeds like success—people congregate where people are. Nothing is so deadly to any method of travel as apparent lack of patronage. The comfort and safety of the individual may be promoted by being the only passenger, but he is not likely to take the trip again. He enjoys his trip best when others could not get reservations. Under such circumstances he determines to book his return trip early.

But if the price were cut there would be no money for advertising. Again it is a question of volume. With the overhead necessarily involved in operating a transport route money cannot be made by sending one plane a day over the route even if the plane were filled to capacity. Money in air transportation can only be made by sending over the route many planes a day, well patronized. If that is not possible, air transport cannot hope to win rank as a profitable industry. To win any place in the sun it must have volume.

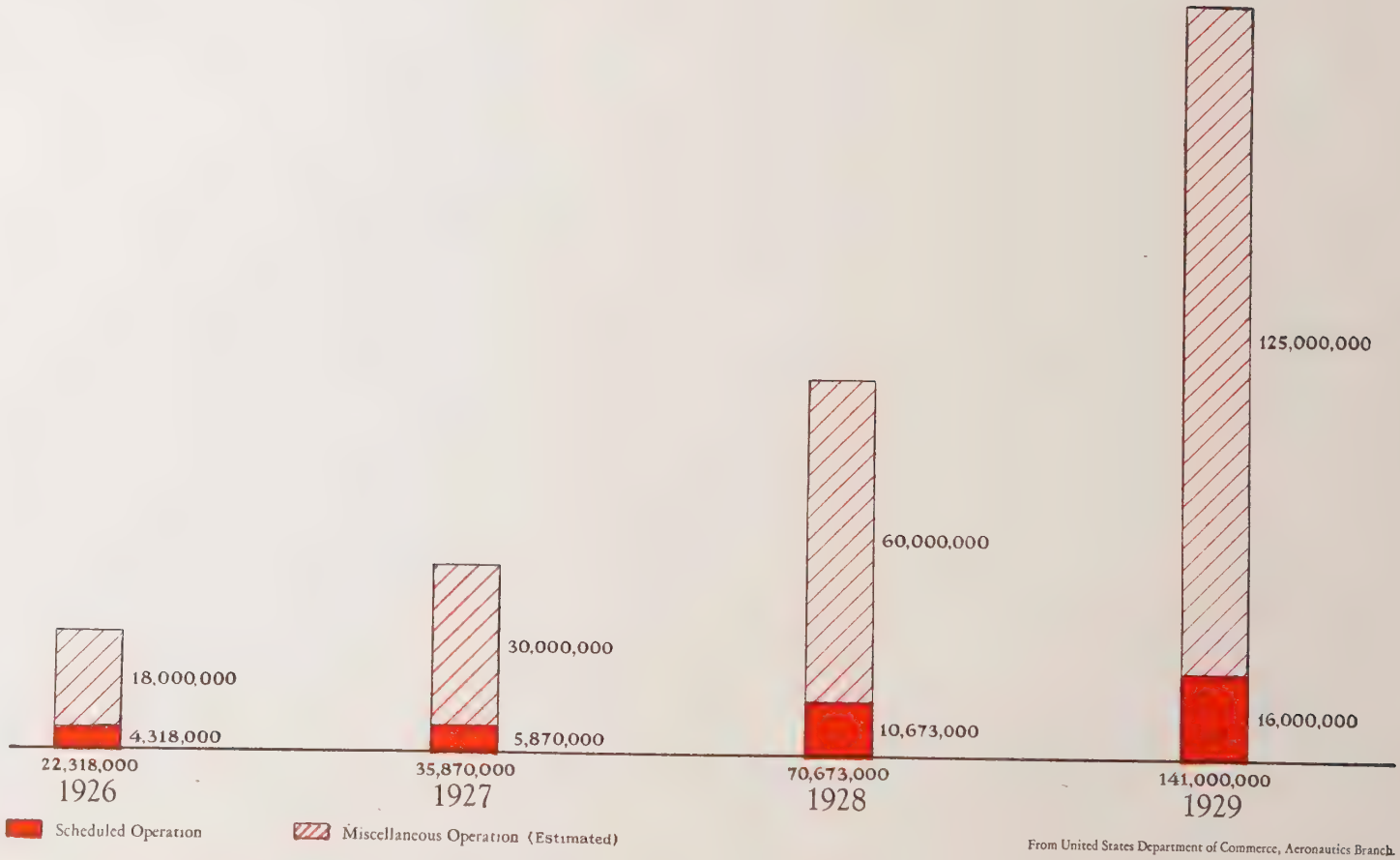
Two Problems

There are just two problems:

(1) Is a potential market available? We believe with service and rate right, the potential market is ample.

(2) How can it be developed most quickly and at least expense? We believe it can be developed most quickly and at least expense through advertising.

MILES FLOWN



From United States Department of Commerce, Aeronautics Branch.

People are largely creatures of habit and it is their habit to climb aboard a train when they wish to get from one place to another. Trains are usually frequent. It requires no special planning to be sure of getting a train, schedules are conveniently available, trains travel regardless of weather, and considerable baggage may be carried without extra charge. To build air travel, new habits of thought must be established. The public must be educated to the advantages of air travel, some inducement must be offered—greater speed, greater comfort or greater pleasure. They must also be educated as to how an air trip can be easily arranged, where schedules and tickets and transportation to the field may be obtained. All this can be done most effectively and at least cost through advertising.

Another fact must be borne in mind. The public has been taught to look upon air travel as expensive, as a luxury for a few and not anything which Mr. Average Citizen should think about in terms of personal participation. This established attitude of mind must be changed. It is not enough to reduce rates. When rates are reduced the public needs to be told about it. Recently several air transport companies have offered rates comparable with rail rates, plus Pullman, but it is our impression as this book goes to press that few people outside the aviation industry know that they can make some important trips by air at substantially the same rate as by rail. Mr. Average Citizen needs to be told that he can travel by air without excessive cost and the idea of a trip by air must be lodged in his mind as a travel ambition.

The season of 1930 is likely to be a development period in which investment in anticipation of future returns may need to be made. If the investment is made in overhead for running empty planes, the money will be lost and the opportunity for future success will be retarded. If the investment is made in price reduction, in improved service and in advertising, volume will be won and future profits made possible.

CHAPTER IV

1930 A CRUCIAL YEAR

IT APPEARS to us that 1930 will prove to be a crucial year in the aviation industry. The thrill which the American public received from Lindbergh's feat has been converted into an enthusiastic rooting for aviation. Cities have appropriated large sums for airports, the public has invested in airplane stocks, many have gathered at airports on holiday afternoons and paid admission to air meets. All have read with interest stories of airplane feats and shuddered at airplane disasters. Young men have borrowed money to attend aviation schools; a network of air transport lines has been spread over the country.

However, when the winter season of 1929–1930 came on, and air activities slowed down, and the stock market crashed, and the total production of planes in 1929 was estimated to be only about 6,000, and it was rumored that few plane manufacturers or transport companies could show profits except for government contracts, the public began to ask itself: "How real is the aviation industry?"

Winter Gloom Not Disturbing

We are not disturbed by winter gloom. In every year of the earlier period of the automobile industry with the dark days of winter came despondency at times approaching despair. But as the days began to lengthen, hopes began to rise and by spring the industry was once more in full swing, confident of beating any previous year's record.

A similar period of gloom is likely to be an annual affair in the aviation industry and the present gloom in no wise discourages us. There is, however, one disquieting thought. Public enthusiasm has not been converted into personal flying. To maintain popular interest we believe this must be done. Hence, 1930 seems to us a crucial year, for we doubt whether popular interest in aviation—willingness to pay taxes for airports and to forgo dividends on investment—can be long continued unless it is shown that the general public will take to flying.

Personnel

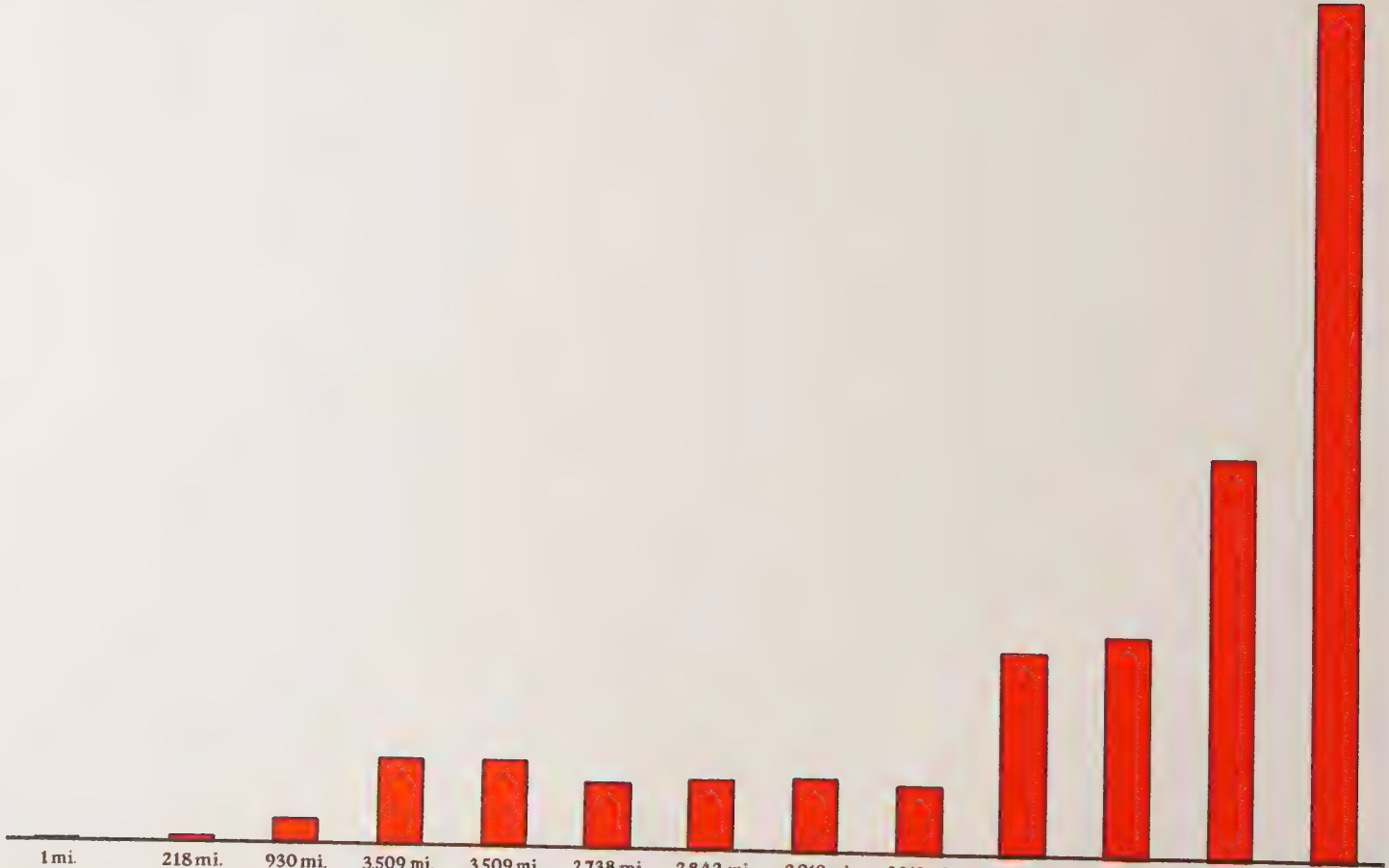
There is another factor of much importance. In the summer of 1929 the aviation industry commanded the enthusiastic services of many young men of more than usual promise. These men have the restlessness as well as the enthusiasm of youth. They want evidences of immediate progress toward achievement. If 1930 convinces them that the industry must wait five years for important progress to be made—a considerable part of them is likely to be lost to aviation.

Summer of 1930

If in the summer of 1930 the public instead of saying, "Let's cheer," begins to say, "Let's ride," this crisis in the aviation industry will be safely past. Money will be forthcoming for needed expansion and profits will be seen to be possible of realization. If present enthusiasm is not converted into personal flying, public interest in aviation is likely to wane, a great opportunity will be lost and further development will be slow and at the cost of much effort and money.

We believe that 1930 will prove a crucial year and that the best effort of the industry should be directed energetically to the education of the public in 1930 to accept aviation as a method of travel for themselves.

AIRWAY MILEAGE



Airway—Marked Air Route Between Air Traffic Centers

From United States Department of Commerce, Aeronautics Branch

CHAPTER V

THE GREATEST SALES DANGER

FROM a sales standpoint, the greatest danger arises from the fact that the industry is seasonal. With the development of the industry, there will come more of year-round patronage of air transport and more of year-round use of private airplanes. But within any time which can interest present manufacturers, we believe the greater portion of retail sales of planes will be made in the spring and summer months.

Since this is so, it is inevitable that models will have their vogue for a season and then become obsolete, necessitating during each selling season the sale of all which has been produced for that season; in other words, necessitating what in some lines is called a "style clean-up."

If this belief be correct, certain inevitable consequences require serious consideration on the part of manufacturers. The automobile industry has had to face this situation, and since statements made in 1915 can now be viewed in the light of the test of time, perhaps we cannot do better than quote from a booklet we issued in that year, based on our Automobile Report of the previous year.

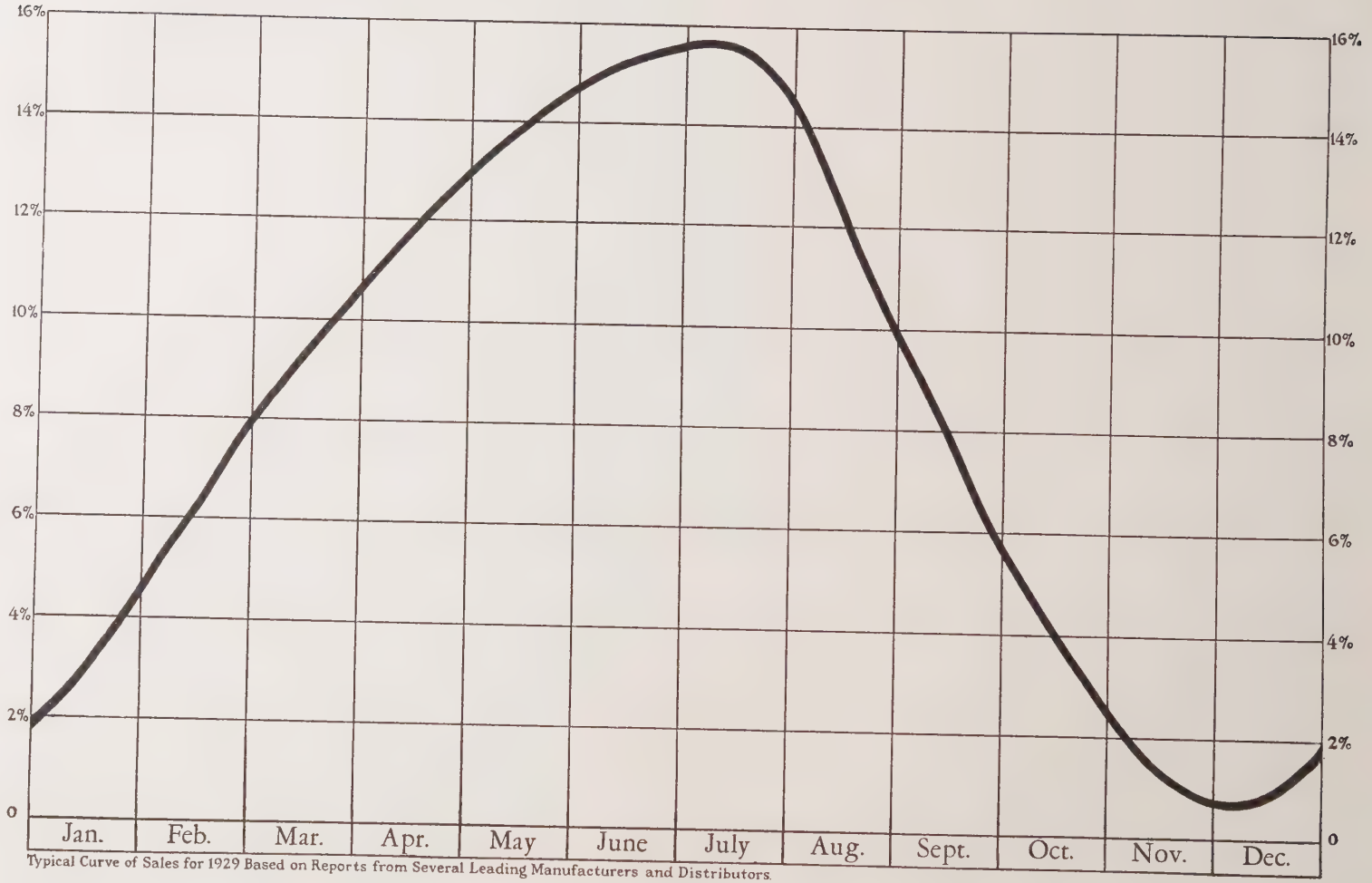
The Danger to the Automobile Manufacturer

"The real danger to the automobile manufacturer and dealer is in the 'style clean-up.' The one who gets caught is likely to go 'broke.' The manufacturer and the dealer must therefore see that their product is moved before the sharp fall in the sales line is reached. To avoid mishap three things must be done:

"First: The possible market must be accurately judged.

"A manufacturer in estimating his possible market for a new year must guess at the outset how many cars of all makes can be sold. That number will depend upon two conditions which no one can accurately foretell: (a) Climatic conditions and (b) general industrial conditions. With favorable climatic and industrial conditions the sale of cars in the new year is likely to be larger than ever before, but with these conditions unfavorable the sale may be less than in the preceding year.

SALES OF AIRPLANES



Typical Curve of Sales for 1929 Based on Reports from Several Leading Manufacturers and Distributors.

"Having guessed the total market for the year, he must then judge the percentage of that market that he himself can sell. This is difficult because conditions are rapidly changing as to price, mechanical features and style elements. The whims of consumers in style lines are fickle, and the manufacturer must be a shrewd judge of what the consumer wants or can be persuaded to want.

"Second: Cars must be ready in time for the sales season. Having once made his guess as to the number of cars he shall produce, the manufacturer has crossed the Rubicon. After that there can be no turning back. If he finds that his car will cost him $50 more to produce than he had anticipated, he cannot stop to have a lawsuit with a parts manufacturer or to redesign a part. The car must be ready for sale when the sales season is on, or he and his dealers are likely to fail.

"Third: Having got his cars ready for delivery he must make certain to sell them during the brisk selling season. He must use enough national advertising and enough sales effort to make certain that he goes over the crest of the sales curve."

Since that was written, there has been much proof of the correctness of the view. Firms which were delayed in production past the peak of the selling season suffered serious loss. Firms which in the winter and spring months failed to put adequate sales and advertising effort behind their products paid dearly in expensive sales expedients and in price cuts with their attendant disorganization of sales force and loss of prestige.

Danger to the Airplane Manufacturer

To the airplane industry in 1930, this danger applies with even greater force than it did to the automobile industry in 1914; for in 1914 automobile design was beginning to reach a point where model changes from year to year were less radical. But that point is not in sight in the aviation industry. As far as we can foresee at the present time, changes in design and construction from year to year are likely to be so great as to render it impossible to sell last year's product except at a serious price reduction.

Price reduction not only brings immediate loss to whoever carries the stock; it also brings discouragement to dealers and makes them ready to listen to the offers of another manufacturer, it makes it much more difficult to interest the best type of new dealers and, worst of all, it makes dissatisfied owners out of those who made recent purchases and creates a popular impression of failure that is far-reaching in its effect.

We do not undertake to say in this report how many airplanes can be sold next year. There are too many uncertain factors—no one can foretell what kind of flying weather there will be in the spring and early summer months, and weather with airplanes, as with automobiles, is an important factor. It is impossible to predict whether new devices and achievements will reassure the timid or whether a series of spectacular accidents may frighten the public. We do not feel safe in going further than to say that in the early part of 1930 it seems to us possible that by reduced rates and constructive advertising, a good step forward can be taken in securing patronage for air transport lines, and that barring unfavorable weather and spectacular accidents, some increase in sales to individuals may be expected.

Three Compelling Requirements

The problem of the individual manufacturer is even harder to judge, for in addition to the uncertainties of the entire market, every manufacturer faces the uncertainties of what his competitors may do in design and price and in sales and advertising efforts. Yet in advance of the market he must make the decision of how many planes to build, for mid-market decisions to increase production are likely to lead to completion of the product only as the market wanes.

When a manufacturer has decided how many planes to build, he faces three compelling requirements:

(1) That his estimates for production be based on a conservative judgment of what he may expect to sell.

(2) That his planes be ready for delivery when the sales season is on.

(3) That he put enough advertising and sales efforts behind his product before the crest of the sales season is reached to make certain to move all his product without clean-up bargains.

A failure in one of these three respects is likely to cause disaster.

The risk of spending a little more money for advertising and sales efforts than would be necessary to move the product is a small risk compared with the possible disaster of price cuts, disorganized sales force and unfavorable public opinion. After deciding what sales and advertising effort may do the job, some additional expenditure for insurance may prove a good investment.

CHAPTER VI

WHO WILL DOMINATE THE AVIATION INDUSTRY?

AT THE end of 1929 the number of airplane manufacturers was estimated to be about 150. For how many of these is there a permanent place? In 1914, when there were 130 automobile manufacturers, we said: "Looking at it from a retail standpoint, it seems probable that thirty or perhaps forty cars can be sold in sufficient number to warrant manufacture. It thus appears that at the present time the retail automobile business is passing through a transition period in which it seems likely that the number of firms will be decreased, a higher grade of salesmanship developed and selling methods materially modified." In 1929, 29 makes of cars produced by 12 companies sold 98 per cent of the total.

From a retail standpoint, there appears to be opportunity for only a limited number of makes of planes. In many cities the market for airplanes can satisfactorily support not more than four dealers with facilities for housing, demonstration and service. If it were possible for one company to have a good dealer in one city while some other company had a good dealer elsewhere, a considerable number of planes could get acceptable representation, but the airplane industry by its very nature is national.

To have a good reputation in one locality a company must have a good reputation nationally. Hence, it is likely to come about that the same manufacturers who have good retail outlets in one locality will have them generally throughout the country, and these are likely to be those manufacturers who by their consistent performance in manufacture and their consistent use of effective advertising best create and maintain potential markets.

Greater Concentration Than in Automobile Industry

It seems to us that the concentration in the airplane industry will be even greater than in the automobile industry, for the total volume of the industry

will be less, confidence in sturdiness of manufacture will be a more compelling factor, and style variations will be less effective in winning fragments of the market. It seems to us probable that in ten years fewer than twenty makes of planes produced by less than ten companies will produce more than 90 per cent of the volume.

And who will the "fewer than ten companies" be? It is impossible to predict. Among the leaders ten years from now are likely to be some today unknown in aviation.

In 1914, when the automobile industry was much further advanced in manufacturing than is aviation today, at a time when some people thought entries for the race had been closed, we said: "So long as the style element exists, it will be possible for a company that has something distinctive to offer and is prepared to advertise extensively to obtain a hearing.

"It seems probable in the higher grades of cars, where style is more important, that a favorite car may find its leadership challenged by an unexpected rival, and it will be difficult for any manufacturer to maintain for a series of years acknowledged leadership in any of the higher classes."

Chrysler, entering the field at a later date, demonstrated that the statement was true.

In aviation, as in the automobile industry, there will always be the opportunity for a newcomer who has something excellent and distinctive, who is well financed and who uses advertising strongly, to educate the American public to accept his product and thereby win for himself a prominent place among the leaders of the industry.

Factors Which Will Pick the Winners

While it is impossible today to point out what firms will best succeed, the factors which will pick the winners seem clear.

(1) A meritorious product, consistently kept up to the best thought of the industry on design and always sturdily manufactured.

(2) Ample finance.

(3) Advertising which consistently and forcefully builds public belief in the company and its products.

(4) Efficient sales distribution.

(5) Correct judging of how much can be sold.

(6) Having the product ready when the sales season is on.

(7) Putting enough sales and advertising power behind each year's production to move the product without cut-price clean-ups.

He who excels in these factors will lead the industry. Consolidations by the act of purchase may temporarily win leadership but cannot long maintain it except by excelling in the factors listed above. Brand reputations are builded by a superior product and effective advertising; they are quickly lost when the product deteriorates or the advertising is discontinued.

Monopoly Impractical

Monopoly in any popular type of plane appears to us impractical. If by mergers monopoly was brought about, such monopoly would be only temporary, for it would immediately give a market opportunity to some competitor to produce and sell a competing product.

The public apparently has little objection to buying products from great corporations; they also apparently have no especial preference for doing so. Most people buy solely on the basis of what they believe a product will do for them in return for the price charged. The name of a company, great or small, which by performance and by advertising has won for itself public confidence, adds much to the value of any brand which it may put out or may acquire—but in the end any brand must stand on its own feet and succeed or fail as the product upon which it is placed, by its merit and its advertising wins and holds public belief in it.

A single brand name may, we believe, be successfully used on two or more planes. But the poorest plane bearing the name is the weakest link in the chain which holds public confidence, and the reputation of all models bearing the brand tends to grade down to the level of the poorest under the name. Whenever more than one model bears a brand name, therefore, it is of prime importance that sufficient effort in manufacturing and advertising be placed behind each model to enable it to rank on a par in its class with all other models bearing the same name.

CHAPTER VII

OUTLETS FOR PLANES

There are several outlets for planes. Among the more important of these are:

1. Transport companies.
2. Government contracts.
3. Schools.
4. Individuals.
5. Business firms.

Transport Companies

Planes will be sold to transport companies direct from the factory. From a manufacturer's standpoint this market has the danger inherent in a market composed of a limited number of possible buyers, namely that the acquisition of a few large contracts in one season may necessitate plant expansion and in another season a failure to renew these contracts may leave an unprofitable overhead of plant and equipment rapidly growing obsolete.

The manufacturer's best protection against this hazard is to educate the public to prefer his product. Popular preference for certain types or makes of planes will make transport companies less likely to abandon them for others, and obsolescence of transport models which the public has been taught to appreciate is likely to be retarded.

Government Contracts

Government contracts for several years after the war kept the aviation industry alive, and they are today an important factor in aviation development. The demand of the army and of the navy has been insistently for something better and manufacturers desiring Government contracts have been spurred on to better designing and more accurate manufacture. Government contracts are made direct with manufacturers.

Schools

Training schools are an important outlet for smaller types of planes. There is a tendency for manufacturers to establish or gain control of schools and to make them outlets for their product. This tendency may grow, but there are some practical limitations to what can be accomplished in this way. In other lines when a wholesaler has gained control of retail outlets to insure a market for his merchandise, it has frequently led to overstocking his retail stores and to crowding of slow-moving merchandise onto their shelves with the result that the retail stores under these handicaps have sometimes found themselves unable to compete successfully with stores free to buy what their trade preferred and in the quantity their judgment dictated.

Schools as controlled outlets for merchandise for which public demand has been created will insure a certain volume without penalty; but controlled school outlets as a substitute for progressive manufacture or for advertising will prove disappointing; for schools cannot afford to ignore public preference for brands of planes.

The function of the school in training prospective flyers is so closely related to the sales agent's problem of finding new prospects that in each community there are likely to be close working agreements and in many instances unified control of leading schools and leading sales agencies. Hence the manufacturer in seeking school outlets is likely to find the problem closely related to his problem of obtaining the right type of sales representation.

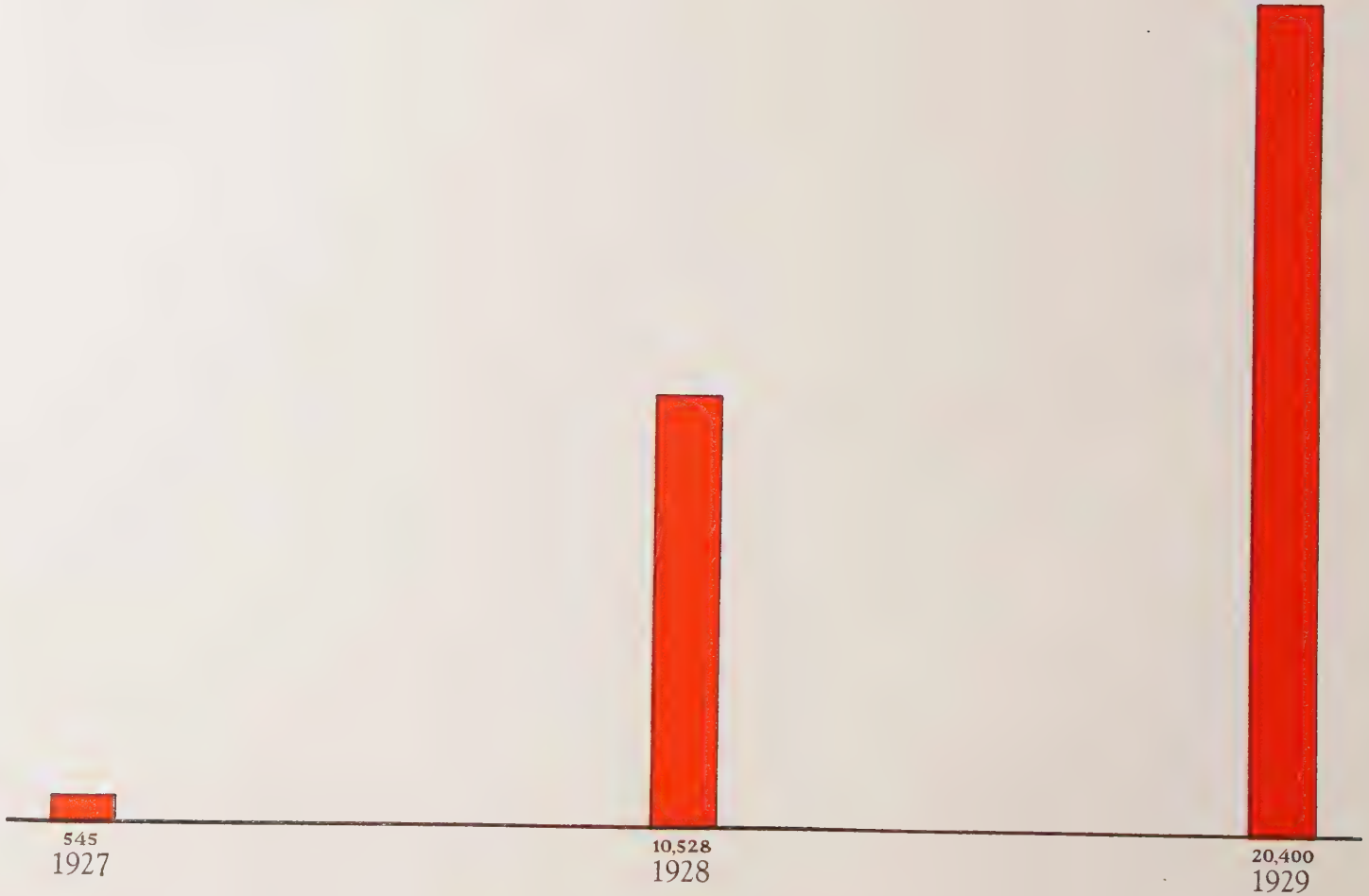
Sales to Individuals and to Business Firms

Sales to individuals will for the most part be through dealers. With wealthy sportsmen, flying clubs will in some cases be a factor in determining preference, but purchase will ordinarily be made from a dealer.

Business firms will be sold both by the manufacturer and the dealer, depending upon the number and type of planes bought, the relations between the firm purchasing and the manufacturer, and upon the business practice of the individual manufacturer.

STUDENT PERMITS

ISSUED OR PENDING



From United States Department of Commerce, Aeronautics Branch

CHAPTER VIII

DEALERS, SCHOOLS AND SERVICE

IN ITS method of distribution, the aviation industry for the most part is following the automotive industry. Distributors are appointed who have control of definite territories and who buy from the factory. These distributors in turn may establish dealers who buy from the distributors. As with the sale of automobiles in the early days, the sales organization of no older industry appears well adapted to the task of the new industry and it appears likely that a new personnel will have to be built up. As with the automobile in the early days, the personnel which offers itself to the aviation industry is able to contribute more of youth and enthusiasm than of financial strength and business experience. The sales problem, however, requires a strong type of sales representative. No active market for airplanes is at hand; sales need to be created. The work calls, to be sure, for youthful enthusiasm and energy, but it also calls for other important qualities.

Requirements for Airplane Distributors

The requirements for successful airplane distributors, as we see them, are: (1) good business judgment; (2) adequate financial backing; (3) more than usual sales ability and (4) enthusiasm for the aviation industry.

Ability to pilot a ship is desirable, but seems to us less essential than the qualities listed above. A person with adequate business and sales qualifications can hire a pilot for demonstration, while the pilot is not so likely to be equally successful as the employer of men with better business ability. Furthermore, it seems to us more possible to teach a person with the requisite business qualifications how to fly than to teach business judgment and sales power to a person whose experience has been restricted to practical aviation.

Qualities required for success in the aviation industry are the same as those which can win success in other lines of business. Hence, the aviation industry in building its distributive organization must compete with other industries for talent.

Strong Manufacturers and Strong Dealers

At the present time the number of persons with the desired qualities who are inclined to enter the field of aviation are so limited that they can very largely choose the companies for whom they will work. The problem of the aviation manufacturer, therefore, is not so much selection as it is persuasion.

Manufacturers want strong distributors and strong distributors want planes which offer the best market opportunities. Strong distributors may have enough confidence in their ability to believe they can sell planes for an unknown company, but they are smart enough to know that they can sell many more planes and can much more largely cash in on their time and talents and much better build prestige for themselves in their communities by applying their efforts to a brand of plane for which the manufacturer has created a potential market. Hence, it comes about that strong manufacturers and strong dealers gravitate together; weaker manufacturers are left with weaker dealers and are confronted with inevitable failure.

Schools as Sales Outlets

Some unique features of merchandising are presented by the aviation industry. In the first place, schools of instruction are an important factor. In the replies to the questionnaire sent to all owners of planes, the school was listed by 22 per cent of the owners who replied as an influence in their purchase. In the opinions of some whom we consulted, the school was placed as high as a 50 per cent factor in sale to first purchasers. Probably the present influence of schools on first sales is somewhere between the two per cents.

Since at present all who would fly must receive careful instruction, the school is likely to continue as an important factor for some time. However, as the knowledge of flying becomes more general, especially if with the improvement of planes less instruction will be needed, the school will be a less important factor. Then, too, in the choice of planes on the part of those who are purchasing for a second or third time, other factors are likely to be more influential. Hence, with the evolution of the industry, the school will become a less important factor.

Service

Service on airplanes is unique in that service can be rendered from Kansas City to any part of the United States in approximately twenty-four hours. While such concentration of service would not be likely to prove satisfactory

to plane owners, yet efficient service for replacement parts and more important labor jobs can be rendered from a relatively small number of centers strategically located in the various sections of the country. It will be relatively easy for any plane in the territory to reach the centrally located service station, or if a plane be incapacitated, a service plane with spare parts and mechanic can very quickly reach the point of call.

Closing of sales likewise can be handled from a limited number of centers, dealers throughout the territory doing preparatory work on prospects and a salesman from headquarters helping with final demonstrations and closing.

Primary Need

A manufacturer's primary need is a limited number of strong central points of distribution rather than a multitude of dealer outlets. This has some distinct advantages, since the manufacturer's problem of selection and supervision involves a relatively small number of persons. On the other hand, it places a greater responsibility on a manufacturer to secure thoroughly capable representatives in every territory.

As sales volume of the industry grows, a manufacturer will probably find it advantageous to extend somewhat the number of his first grade sales and service stations, but so far as we can foresee, no such intensive distribution as we have of passenger cars will be required for effective national coverage.

Factory Branches

The concentration of sales and service into a limited number of cities and the necessity for having every grade A outlet efficient is likely to cause some manufacturers to establish factory branches for sales and service where satisfactory distributors cannot be obtained.

The factory branch has the advantages of controlled sales efforts, standardized service, uniform accounting, and consistent policy on trade-ins. When properly manned and directed, factory branches give a manufacturer maximum control of his sales. The drawbacks of the system as compared with the distributor system are that it requires greater investment on the part of the manufacturer, and that it offers less incentive to initiative and energy on the part of individual sales representatives than is likely to be shown by those who have invested their own money. Hence greater sales initiative and effort on the part of the factory headquarters are required to make the branch office system successful.

Some of the early experiences of the automobile industry with branch houses were not satisfactory. In our Automobile Report of 1914, the relative merits of branch houses and independent distributors for that stage of the automobile industry were stated as follows:

"As between these two systems the branch house appeared at first to have some advantages:

"1. It enables a manufacturer to put a sales organization into a city regardless of whether one of the strong dealers of the place can be secured or not.

"2. It enables a factory to dictate sales policy, maintain price, control local advertising and supervise local dealers.

"3. It enables a factory to execute quickly a new policy and to move cars by a sudden cut, or by extra pressure of advertising and salesmanship.

"But the disadvantages were found to outweigh the advantages:

"1. The branches are expensive.

"2. A salaried man is often not so efficient as an independent agent. A man is apt to strive harder when working for himself on a profit and loss basis than when employed by a corporation at a fixed salary. Having invested his own money in cars, he will make every effort to move them, if necessary making a deep cut into his commission. The branch manager, prevented by factory regulations from cutting price, often feels that he has done his duty when he reports the cars unsalable.

"3. The manager often gives away service too freely. What matter, if it is to be charged to the factory? But the distributor who knows that every dollar of service comes out of his own pocket is more careful.

"4. The salaried manager also seems more ready to accept disadvantageous trades, and less diligent in disposing of his second-hand cars."

Applies to Aviation Industry

It appears to us that much of this reasoning applies to the aviation industry and that the balance of advantage at present is with the independent distributor if men with business and sales ability can be obtained as distributors.

It is, however, not unlikely that some manufacturers, finding it difficult to get satisfactory distributors for some important territories, may try out the branch system, and it is possible that they may by efficient direction and supervision be able to overcome the disadvantages and to retain the advantages of factory-controlled outlets.

The Advertising Problem

The advertising problem is much the same with either system of distribution, for only as potential markets are created for a plane can efficient distributors be kept satisfied or factory branches show satisfactory profits.

DIVERGENT VIEWS IN THE INDUSTRY—Dealers

I am traveling the territory now looking about for good dealers. I am familiar with the automobile game as I was in it for a good many years before I became interested in aviation. As far as I can see, the automobile dealer is the best bet for building up distribution of airplanes. He knows selling and can finance himself; besides he has had experience with all the sales problems that the aviation industry will fall heir to. There is one difficulty, however, at present, and that is the automobile dealer is not yet thinking in terms of airplanes. Of course, there are a few exceptions, but for the most part they are hard to interest.—Distributor.

I don't believe anyone today can tell who the dealers in the aviation industry will be. We thought the automobile dealer and distributor would be a nucleus, but few of them are able to do anything when it comes to selling airplanes.—Manufacturer.

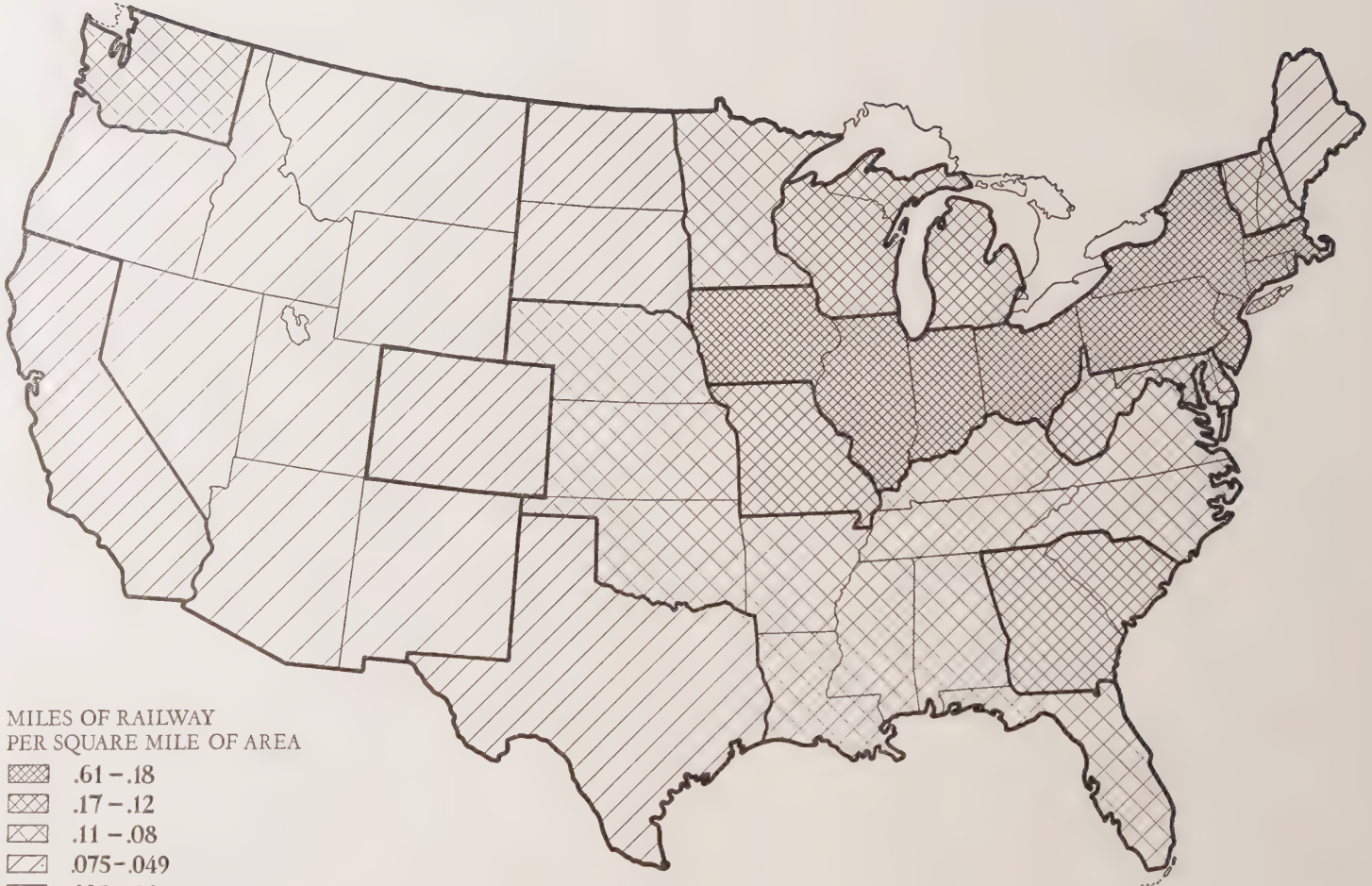
In our dealers we want a man who is a good salesman, and in addition one who is able to finance the business. The automobile dealer is about the best so far. He usually has good sales ability and has financial connections.—Distributor.

We had worked out a national plan for distribution, but cannot find men of business sense and sales ability capable of selling airplanes. In one city, for instance, out of 36 applicants for dealerships, I spent six weeks there and narrowed them down by personal interview and investigation to three and not one of the three has turned out to be any good. We have other similar experiences in practically every section of the country. We may take on a dealer that has ample financing up to the millions, and he is unable to make a go of it.—Manufacturer.

Distribution is going to be a big problem for the reason that selling aircraft is essentially different from any other business. Airplanes will have to be sold at the flying field with proper show places and facilities. Automobile distributors and dealers will make good airplane dealers if they maintain an absolutely separate airplane division and put competent and well-trained air men in charge.—Manufacturer.

I will require salesmanship first and prefer sales ability above any other faculty. Second to that I believe it would be very helpful if a salesman could pilot and actually demonstrate the ship he is selling. I believe that capacity will contribute toward gaining the confidence of the prospect. It is, however, secondary in importance to sales ability.—Distributor.

RAILWAYS IN UNITED STATES



FROM INTERSTATE COMMERCE COMMISSION

CHAPTER IX

TURNOVER OF GENERATIONS

THE turnover of generations will, we believe, work wonders for the aviation industry. Historians allot three generations to a century. In other words, the period of time in which one group of men is active in business or politics is approximately thirty-three years. In the next eleven years, one-third of all the merchants and doctors and business men and politicians will be gone and in their place will be another third who are now in school and college and playing around the airports.

The third which will pass are those who are most difficult to sell on aviation. They are resistant to all ideas of personal flying, and even those who may be apparently won over, easily return to a negative attitude when frightened by some accident or by rumors of financial unsoundness in the industry. They are the ones who have the money to pay excess prices for air transportation and airplanes. But most of them will not spend money to get off the ground.

The third which take their place are today eager to ride, but they lack the money. Had they the price nothing could suit them better than to take air trips.

A Momentous Change

The change which will take place in the next eleven years, when the part of the market which is today most influential and most negative is replaced by another third better sold on aviation than any existing part of the market, will be momentous.

In this respect, aviation closely resembles the industry of national advertising. National advertising early became a proved success, but it came into its own only when a skeptical generation who could not be led to believe was replaced by one which in its youth had had its imagination stirred by a vision of national markets and had acquired a conviction that national advertising offered the quickest and least expensive route to leadership.

So too with aviation. To the child today a plane in the air is no more of a marvel than an automobile on the road, a train on a track or a boat on the sea.

To children an airplane accident is not more extraordinary than when a bus load of children is hit by a train or a boat is sunk in a storm or a building is burned with its occupants. All are regrettable and the more so because occasioned by an error of human judgment which might have been avoided and which may occur again, but do not lead to a personal decision to stay out of busses or off boats or away from theaters or out of the air. Children enter a plane with eagerness and register joy unmixed with fear. They are aviation's greatest potential market—and a most valuable asset they are—for any industry which can enlist the faith and enthusiasm of youth is assured of permanency and of continued growth.

The Industry Cannot Afford to Wait

The turnover of generations will in a generation probably solve the market situation for airplanes and airplane travel. But the industry cannot afford to wait for a new generation to grow up. The industry is estimated to have invested already half a billion dollars and needs to educate the present generation to fly.

Furthermore, it should not be overlooked that as this youthful generation grows older, instinctive racial fears will begin to assert themselves and as the generation takes on business and family responsibilities, caution will begin to whisper to stay on the ground. One of the needs for national advertising in aviation is to reach this youthful generation—a generation more influenced by advertising than any preceding it—to maintain their faith in flying and to bulwark their judgment and courage against verbal assaults of their elders.

CHAPTER X

CONDITIONS FOR SAFE FLYING

Five conditions are essential to safety in flying:

1. A reliable make of plane, engine and instruments.
2. The plane must be in good condition at the time the flight is made.
3. The pilot must be skillful, experienced and in good physical condition.
4. The weather must be suitable for flying. Fog, in particular, must be avoided.
5. The plane must be kept within range of a possible landing field.

1. The make of plane is readily observed. The make of engine, instruments and some other parts and accessories can be easily ascertained. The present difficulty is lack of common knowledge as to what are the best makes of planes and equipment. Advertising on the part of manufacturers who make the best planes, engines, instruments and other important parts and accessories can do much to add an element of safety to flying.

Ground Personnel

2. The condition of the plane is primarily up to the ground personnel. The plane is inspected and passed upon by the pilot, but those who know best about the condition of every part of a plane are those who have worked on the plane before it is taken out for a trip. It is therefore a matter of much importance to a company or an individual having a private plane to have a ground organization with excellent training and thoroughly conscientious in its work. Transport companies need to give very close attention to their service departments. By developing exceptionally fine ground service they can get an effective advertising "talking point."

The Pilot

3. The pilot, as soon as the ship starts, must alone carry responsibility for the safety of the passengers. He must make all decisions with reference to the behavior of the plane and weather conditions, and in the absence of orders by radio must decide to complete the journey or make an emergency landing as seems to him best. All this must be done in full view of the passengers. In this respect, air travel is different from rail travel. The passengers do not see the engineer—they do not know when one engineer is replaced by another, but they do see the pilot in action and at the terminals, and nervous eyes are likely to be fixed on him if conditions become unfavorable. The work of piloting passenger planes calls for men of wide experience, of tried resourcefulness, of sound decision in emergency and in perfect physical condition.

The present Government regulations provide that a pilot must have 200 hours in the air before a license is issued to him to drive a passenger plane. They also provide for rigid tests before a license is issued and for frequent examinations for physical fitness. These requirements are fully justified and if any modification is made, it should be in the direction of more stringent regulations.

The public is acutely conscious of the importance of pilots. It is human nature in any emergency to pin one's faith to a man. Out of this trait have come leaders in all lines of human activity. Passenger transport companies have a responsibility to the public to attract and hold pilots of outstanding experience and ability. While this is a public responsibility it is also good business, for one of the best advertising points any passenger transport company can have is a pilot organization of exceptional ability.

Transport companies owe it to the public and to themselves to be extremely careful in the selection of pilots and to surround their pilots while at work and, so far as they are able to exert an influence, in off time, with conditions conducive to perfect physical condition and mental poise.

Weather and Landing Field

4. Weather must be suitable for flying. This topic is discussed in the following chapter.

5. The plane must be kept within range of a possible landing field. The necessity for an extension of airports and emergency landing fields and for markers pointing to these airports and emergency fields is discussed in the chapter on Airports.

CHAPTER XI

WEATHER

THE greatest deterrent to aviation development is fog. Much study is being given to radio guidance of planes and it is quite possible that before long radio devices may make it possible for mail and air express to travel through fog and enable passenger planes caught in a storm to reach their destination safely. It is never sound judgment to predict that the apparently impossible cannot be done, and one would be rash to say that fog may not sometime be conquered, but it does not seem to us probable that within any time which immediately can be foreseen any devices will render air travel in bad weather sufficiently safe for the consistent maintenance of heavier-than-air passenger schedules through fog. Even if devices are perfected and the pilot of a passenger plane operates perfectly, some less skillful pilot of another plane or some pilot with his apparatus out of order may cause a fatal collision.

Sea travel is almost as old as historic man and for many generations navigation of the sea has challenged the best endeavors of men. Yet all that a passenger boat can safely do in a fog is slow down or, better yet, stop and blow a horn. But an airplane cannot stop in the air, and with any considerable number of airplanes cruising in fog, regardless of the development of radio equipment and fog-piercing devices during the next five years, disasters to passenger transport planes attempting to execute schedules in bad weather would probably be so numerous as to retard seriously the growth of passenger traffic.

Play Safe on Weather

The paramount objective of every transport company should be to avoid the possibility of fatal accidents. So far as we can see, the best method for development of passenger travel is to play safe on weather. We believe there should be an extension of government agencies for weather bureau air service with radio transmission so that planes, both transport and privately owned, can get timely warning of fog and storm, and be guided to the ground.

Aviation is navigation. The Government maintains lighthouses, charts, routes and furnishes storm warnings for the navigation of the sea. It is equally proper service for the Government to furnish danger beacons, lighted air routes and weather service for navigation of the air. But because airplanes pass so quickly from one area to another, weather services should be more complete and more immediate. If every station had hourly information as to weather conditions at all other airports within the radius of a single flight, posted where pilots could see the information quickly, it would be helpful to aviation and would conserve human lives.

We realize that regularity of schedule is an important factor in building travel patronage, but in the case of air travel we believe that safety first in judging weather is more important. Passenger planes must be kept out of bad weather if passenger transport is to have the rapid development it deserves. Because the effect of an individual disaster appears temporary and normal traffic is resumed in a few weeks or a few days, it must not be overlooked that every passenger-plane disaster is far-reaching in its effect. Some who were on the verge of trying air travel are deterred. Some who had come to accept air travel for personal use have their faith shaken. Timid relatives and friends have a new incident to urge against airplane patronage. Air transportation can be set back seriously in the development of its markets by frequent recurrence of accidents and these, we believe, can be avoided only by shunning bad weather.

To Insure Safety

What may be the best steps for insuring adherence to safety-first policy we are not prepared to state; but two things appear clear:

1. Anything which can reasonably be done to improve reports should be done, especially in desert and mountain districts where good emergency landing fields are less frequent and where deviation from route is likely to take a plane into no man's land.

2. A pilot is likely to err on the side of taking a plane out; he feels instinctively a trace of cowardice or laziness in deciding not to make a scheduled trip unless the trip is obviously impossible. Perhaps this situation can be improved by placing joint responsibility on the pilot and the airport manager—a negative on the part of either being sufficient to hold the plane. Probably a better solution would be to develop a system of plane dispatching which will relieve the pilot of all responsibility for decision to go or to stay. Whoever must take the responsibility of breaking schedule, it seems clear that freedom from bad

weather accidents can be attained only when those responsible for decisions are convinced that a safety-first policy is desired by their superiors and that they will be rewarded and promoted on the basis of safe judgments rather than on the basis of daring completion of difficult trips.

Conditions in Various Sections

Weather conditions favorable for flying vary in different sections of the country about inversely to the density of population. Flying conditions are best in the Southwest (Kansas, Oklahoma, Texas, Arizona, New Mexico) where there are stretches of sparsely populated plains and an expanse of desert without habitation. Weather conditions are least favorable in the Northeast portion (from the Potomac River to Maine) which contains only 6 per cent of the land area of the United States but in which lives 30 per cent of the total population.

From the standpoint of the sale of individually owned planes, this is unfortunate. With dependable flying weather for trips to Maine and Canadian resorts in summer and to Florida in winter and over the Alleghanies at all seasons of the year, the market for privately operated planes would be greatly increased. This limitation is particularly felt at the price level which characterized 1929 models, for in this section is a very considerable portion of the market for merchandise priced above $3000.

But even if this section were wholly eliminated from the plane market, the potential market of the rest of the United States in which are owned approximately 74 per cent of the automobiles is sufficient to support a substantial industry. As private operation of planes gains momentum in the Central and Far West, it will react favorably upon the plane market in the Northeast, and in the Northeast many will find sufficient good weather, especially in summer and fall months, to make the private ownership of a plane enjoyable and worth the cost.

Weather and Passenger Service

From the standpoint of passenger transport patronage, the distribution of flying weather in the United States is more fortunate, for passenger transport renders its greatest service in long-distance hops and it is fortunate that the long stretches west of the Alleghanies and through the South can be traversed by a plane in safety on most days of the year.

In the Northeast, cities are so near together and intercity passenger traffic by rail, interurban and bus is so frequent that the airplane can contribute less

saving of time than in the other sections. In this section, too, many of the cities, because of surrounding suburbs and the unevenness of the ground, have found it difficult to get suitable airports centrally enough located so that time gained by plane in intercity travel will not be lost in getting to and from the terminals. There will, however, be a considerable development, we believe, of intercity air travel in this section, especially for longer distances such as Boston to New York, New York to Washington, and we believe that schedules can be maintained especially throughout the summer and fall with sufficient regularity to enable air service to grow in popularity.

The most unfortunate feature of the weather situation, from the standpoint of passenger transport, is that regular schedules cannot be maintained safely over the Alleghany Mountains and that through air service from coast to coast will be subject to uncertainty or, if weather conditions are ignored, to danger.

Coöperation Between Air and Rail

This situation was met in 1929 by schedules providing for transportation by train over the Alleghanies. By coöperation between rail and air service, perhaps an alternative schedule might be offered to advantage, a reservation being booked for air trips from coast to coast with a contingent reservation by train over the Alleghanies in case weather were unfavorable. In this way a passenger booking passage across the continent by plane would be assured of making the trip in the shortest time consistent with regard for safe weather conditions and might feel more reassured if he felt certain that questionable chances would not be taken.

For business men the need for assurance of keeping appointments made for definite times is often paramount, and the weather uncertainty of making schedules is a drawback to airplane travel. By coöperation between rail and plane we believe considerable can be done to minimize loss of time through cancellation of air trips and to make the use of air travel for business people more practicable.

DIVERGENT VIEWS IN THE INDUSTRY—Weather

The greatest need of aviation is to overcome fog. Experiments for handling planes in thick weather are under way and I believe something satisfactory will be devised.—Transport Company.

The wire or cable control that has been tried experimentally between Los Angeles and San Francisco by the Army is proving effective. It is a radio control from a cable on the ground

that guides the pilot over the right course and also enables him to know his altitude above the ground at all times. The pilot can follow such a cable-controlled route and maintain his course and uniform height above the ground through any sort of thick weather. Traffic rules can be worked out so that different kinds of traffic and traffic traveling in different directions will follow air lanes at different altitudes. As the industry develops devices will be perfected to overcome the obstacles that seem to check it now.—Engine Manufacturer.

Any instrument such as that being worked on now for the purpose of showing the elevation above ground is impracticable. There is no known way of working this out that is dependable and sufficiently responsive to aid in averting accidents. So-called blind flying is possible if the pilot flies by his instruments 100 per cent. Repeated safe landings, however, cannot be effected. One may do it as a sort of stunt at a field where preparations have been elaborately laid, in the way Doolittle carried it off, but there is no indication that anything can be devised that will enable a strange pilot on a strange field to make the assured safe landing only by means of instruments.—Manufacturer of Instruments.

So-called blind flying is not knowing the height above the ground. The various radio and other types of devices that have been announced from time to time have not proved practicable. We have been working on the principle that we believe may fundamentally be worked out, but up to the present time it has not been uniformly practicable because it varies too greatly at different altitudes.—Manufacturer of Instruments.

CHAPTER XII

COÖPERATION BETWEEN RAILROADS AND AIR TRANSPORT

WHY should railroads coöperate with air transport, which bids fair to become a competitor for distance travel?

First of all, because travel by air is likely to develop anyway and railroads can probably gain more by coöperation than by unfriendly competition and, second, because through coöperation they can help build a service of great value and interest to the American public and, third, because by doing so they can stimulate travel and out of this increased travel can reap benefit for themselves.

More people can be persuaded to make trips from coast to coast in two days than can be sold on making the trip in five days. By air one can make the transcontinental trip in a week-end and return on the next week-end, thus having an entire business week for engagements on the Coast with the loss of only one week from the home office, whereas by other means of transportation it takes two weeks from the home office to get one week's accomplishment on the Coast. This makes business trips to the Coast on the part of business executives, of salesmen, and of service employes much more feasible.

Some who desire to spend the winter on the Coast are deterred by the thought of being so far from home or business in case of emergency. For such people the airplane makes possible what otherwise would have seemed impractical. Some feel unable or unwilling to endure five days of travel, but have the strength for the shorter airplane trip.

Some people object particularly to the dust and the heat of the desert. These may go to the Pacific Coast by air without discomfort. Many have vacations of two or three weeks. The time has seemed too short for a trip across the Continent, but with the journey reduced to two week-ends, leaving almost full vacation period at the opposite coast, the trip becomes practicable.

Some who have crossed by rail can be sold on going again for the view from the sky. Some who get a sense of weariness out of other forms of

transportation will get exhilaration and refreshment from the ride in the upper atmosphere.

For many of these extra trips the railroads may be beneficiaries for part of the journey.

Some will be aroused by the air transport advertising and by the air trips of their neighbors and friends to go somewhere themselves, and of those, some will choose to go by rail.

Thus, it will come about that air travel as it develops will largely build new markets and by the stimulation it gives to making the public more travel minded will do much toward compensating the railroads for patrons who are won away.

CHAPTER XIII

SPEED VERSUS COMFORT

AIR travel has already demonstrated that it is much the quickest method of travel. Cruising speed of planes used in passenger transport in 1929 was for the most part approximately 100 miles an hour. Since in air travel the passenger has no sense of speed, there is likely to be an urge on the part of some riders for faster and still faster transportation and on the part of all riders a ready acceptance of any speed which can be maintained without discomfort.

While there are practical difficulties in the way of attaining greater speed simply through the application of increased power, it seems probable that the evolution in plane design and in motor types will lead to increased speed. Just what eventually will be considered normal speed for transport planes cannot be judged with any certainty, but it seems quite possible that within five years an average speed of 150 miles per hour for passenger planes may not seem unusual.

We believe increased speed will be a valuable sales argument, for it will not only save time which may prove of value, but it also decreases the hours of travel which to many people are considered hours of discomfort by any means of locomotion—and speed appeals to the American temperament.

But if one considers the problem of winning a market of air riders, even at 100 miles per hour traveling in a bee line without traffic stops the plane has so much advantage over any other form of travel that it already has an argument to win those with whom speed is a primary consideration.

More Comfort

For the development of a great popular market, therefore, it appears to us the primary requisite is not more speed but more comfort. While it is an American characteristic to be in a hurry and people prefer to travel by the swiftest means, yet most people's desire for speed balks at discomfort. What needs to be sold is the joy of flying. When the public comes to believe that it is

a lot of fun to ride through the air and that this fun can be had at approximately the cost of other methods of transportation, passenger transport companies will not lack patrons.

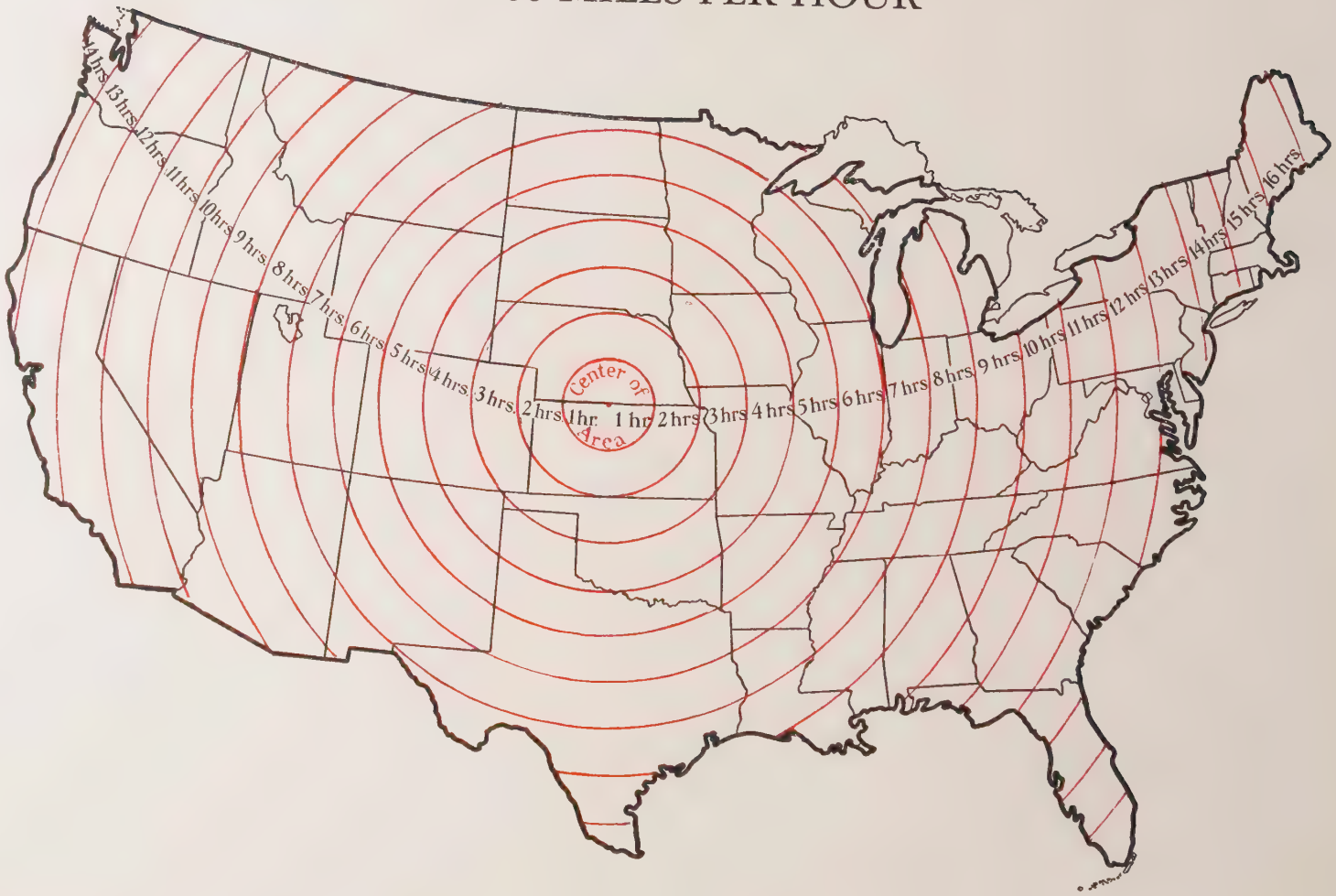
Airplane travel can be made, we believe, the most comfortable method of transportation. In an airplane one rises above the heat and the dust of the earth's surface. One may even cross the desert in perfect comfort, while people below swelter in the summer heat. The air traveler can arrive at his destination with clothing not soiled by dirt or perspiration, and refreshed by a ride in the stimulating upper atmosphere. If the air traveler misses flashes of pleasant close-ups, on the other hand he escapes all the unpleasant sights of the wayside and he gains a new kind of pleasant and inspiring view with a majesty and interest all its own.

The View

Man has always loved to climb mountain tops for the view. From the airplane, without effort, he gets the mountain-top view of cities and farms and lakes and rivers spread before him. If he finds this view monotonous, it is largely because he has not been taught what to look for. A map of the route given each passenger, accompanied by a brief text in clear type pointing out views of interest, would help to educate the public to new interests—the location of cities, for instance. Pittsburgh, on the point of land where the Allegheny and Monongahela rivers meet to form the Ohio, thus, in the early days, controlling river routes into western Pennsylvania; the way cities are built from center outward; the varying size of farms; the regular arrangement of roads west of the Alleghanies contrasted with the winding roads of older sections; the mountain ridges and where they divide the waters; how much of the United States is rural—how little area is covered by cities; the beauty of rural landscape with intermingling forests and farms; the beauty of the sky and especially the beauty of rivers and lakes glistening with reflected rays of the sun, and the vast, uninterrupted view of the great out-of-doors.

The scene changes so rapidly as to maintain new interest. To the transcontinental traveler, the Central West with many small farms, numerous cities and villages and a network of railroads, gives way gradually to larger farms, fewer cities, fewer roads and railroads. In turn, as the farms grow larger, vacant land appears between them—the vacant areas grow larger and ere long become the wastes of the desert and then the mountains and the green valley and the Pacific Ocean. All this panorama passes so rapidly as to give the traveler a new and inspiring picture of his native land. One may have traveled widely, but there is much he cannot see or appreciate until from the air there is

AIRPLANE DISTANCES IN HOURS AT 100 MILES PER HOUR



AIRPLANE DISTANCES IN HOURS AT 150 MILES PER HOUR

unfolded below him the great expanse of our magnificent country. From the air the greatest works of man seem so puny—the panorama of nature so awe-inspiring.

Things to be Done

Some things remain for the industry to do in providing comfort for travelers. It should be remembered that we are acutely conscious of new discomforts and pay little heed to those to which we have been accustomed from childhood. So, airplane travel being new, mature people are keenly awake to its discomforts and unable fairly to compare them with the discomforts of other forms of travel. What are these discomforts? There are two major ones:

1. Noise. This must be reduced so that conversation can be carried on as comfortably as in a Pullman sleeper if it is not to remain a deterrent factor. A method has been devised by which it is claimed exhaust from the engine may be utilized to reduce greatly the noise of the engine and to lessen materially the noise of propellers without consequential loss of efficiency. We cannot pass judgment on this or on any of the other methods suggested for solving the noise problem and can only say, that from the standpoint of building markets, location of motors, muffling of engines, soundproofing of cabins and other suggestions for reducing noise to a minimum are worthy of careful study, for the reduction of noise is a requisite step in building a market.

2. Wind and Dust of the Airport. In most airports dust raised by the airstream from passing planes and from motors being warmed, blown by a wind sweeping the field, is a major discomfort which must be abated if airplane travel is to become popular. Hard-surfaced aprons and runways, oiling of fields, keeping planes not required for immediate service away from the passenger building, covered passageways from waiting room to plane are some of the things which can help.

Other Discomforts

There are other discomforts which perhaps should be mentioned.

3. Rough Air. Larger planes, and a recognition on the part of air transport managers in selecting types of planes that comfort is more important than speed, will do considerable to secure greater steadiness when the air is rough.

The possibility of encountering rough seas does not prevent thousands of people from making coastwise voyages. The possibility of encountering rough air will deter some people but will not prevent a satisfactory development of air travel.

4. Vibration. Vibration in a good transport plane is not greater than on many steamboats and railroad trains but since in a first trip in an airplane one is alert to all sensations, the vibration attracts attention and appears to many as annoying. Probably vibration will be reduced through improvements in plane design and at any rate will, we believe, not seriously impede the growth of passenger travel by air.

5. Unpleasant Passenger Buildings. With a few exceptions, little attention appears to have been given to making airports pleasant places. The approach to the passenger field should be made attractive with shrubs and flowers, the waiting rooms should have an artistic touch and the wash rooms should be well cared for, there should be restaurants in which one can enjoy a meal amidst pleasant surroundings, with food the equal of the best offered by downtown hotels—and above all, there should be a covered passage to protect passengers against wind and dust.

6. Difficulty in Reaching Airport. Lack of satisfactory facilities for reaching the airport from downtown and in turn lack of facilities for reaching centrally located hotels expeditiously and comfortably from the airport is a handicap to air travel in many cities, especially in some of the larger ones.

7. Lack of Room in the Cabin. Lack of room to move around and a feeling of being crowded is mentioned by some as a drawback to air travel. There are, at least in present plane manufacture, obvious limitations to what can be done profitably in allotting space per passenger. In the building of larger planes and in the evolution of cabin designs, it may be possible to work out some compromise which will give passengers a greater sense of sufficient room without too seriously reducing the pay load.

8. Unsatisfactory Condition of Plane. A plane because of dust from the fields and of occasional cases of air sickness needs watchful attention to keep it in acceptable condition. Passenger cabins and wash rooms must at all times be kept in unobjectionable condition if air travel is to win approval.

Selling Leaders

In considering these discomforts it should be borne in mind that markets are most easily won by selling first those who are recognized for their business positions and their social standing. These people can be won to air-mindedness only by having at airports the type of surroundings and of service to which they are accustomed.

Probably many people have been superconscious of the discomforts of air travel because they have not known what else to look for. Advertising to

teach people to look for joy in air travel, to educate them as to what may be seen from an airplane window, may do much to divert attention from the little discomforts which are incident to any form of travel.

Short Trips

For short trips some of these discomforts are less of a handicap and speed plus skillful scheduling become important factors. There is at present a resistance to early morning departure—most people who have a morning appointment in a near-by city, in view of their established custom, prefer to take a sleeper rather than to arise extra early and drive to an airport for an early plane. We believe that with the development of air travel and with advertising this resistance will be lessened. An early morning ride in an airplane is delightful and invigorating, and the opportunity to spend a night at home or in a hotel will, with education of the public, come to appear to a considerable number of people an offset to the necessity for early rising. For such trips as these, speed, where it can reduce the travel time and enable later starting in the morning, is a matter of much importance.

For short intercity hops early afternoon is an advantageous time for air travel. A person may have arrived by sleeper, may have completed his business in the forenoon and by airplane can meet appointments in another city on the same day. Ultimately intercity travel by air will, we believe, become so popular that between many cities trips can be profitably scheduled at frequent intervals throughout the day. Until air travel reaches that point, a careful study of schedules with reference to business, social and theater engagements will prove profitable, and for these trips speed which reduces the time taken out of the business hours is important. For an intercity hop of 300 miles, a schedule of two hours instead of three hours represents a consequential gain which has sales value.

Yet while we emphasize the value of speed and of schedule in short intercity air travel, we cannot escape a conviction that only a minor portion of the intercity travel market is willing to sacrifice comfort for speed and that the way to make intercity air trips popular is to make them pleasant.

CHAPTER XIV

RATE

MANY with whom we talked did not agree that airplane travel will become the least expensive method of first-class land travel. They stressed the necessary cost for accuracy and thorough testing in the manufacture of planes, the high cost of responsible pilots and the large investments in airports.

To these arguments it may be replied that accurate manufacture of parts effects economies in assembling which to a considerable extent offset the extra cost of accuracy in manufacture of parts; that the cost of personnel per passenger hour will be reduced as planes become larger; and that with the improvement of planes more flying hours per week for personnel would be likely to come about without proportionately increasing the cost of personnel per passenger mile. Costs for airports and for executive overhead per passenger mile will decline as volume of passenger traffic grows.

On the other hand, air transports need to buy no right of way, to construct no roadbeds, and their terminals located on the outskirts of cities or on built up waterfronts municipally owned and connected with the center of town by highways built and maintained without cost to themselves, give air transport a distinct cost advantage over railways or interurban electrics.

Lower Costs

As traffic increases and the annual changes in airplane design become less radical, so that quantity production becomes possible, the cost of equipment will be greatly reduced. To a layman it would appear that from the standpoint of materials employed and difficulty of manufacture, an airplane is comparable to an automobile of equal capacity and of equal grade of construction.

An airplane is larger and requires greater precision in manufacture, but on the other hand, does not require the transmission construction which is one of the most expensive parts of an automobile. But because airplane volume will, so far as we can foresee, remain smaller than the automobile market and

TRANSPORTATION RATES COMPARED

	AIR		RAIL	WATER	BUS	PRIVATE MOTOR
	July 1929	February 1930				
Albany–New York						
Time	1 h 30 m		3 h 5 m	10 h	7 h 50 m	5 h
Fare	$25.00	$14.70	$5.63	$3.00	$4.00	$14.90
Miles	142		142	....	149	149
Boston–New York						
Time	1 h 45 m		5 h	15 h	9 h 30 m	8 h 6 m
Fare	$34.85	$17.43	$10.96(x)	$9.50	$4.00	$24.30
Miles	200		229	269	243	243
Chicago–Cleveland						
Time	2 h 45 m		6 h 55 m	74 h 15 m	13 h 30 m	12 h 34 m
Fare	$37.50	$17.60	$14.53	$43.00	$7.50	$37.70
Miles	320		340	989	377	377
Chicago–Detroit						
Time	2 h 30 m		5 h 55 m	65 h 45 m	9 h 55 m	9 h 20 m
Fare	$30.00	$18.00	$11.91(x)	$41.00	$4.00	$28.00
Miles	252		284	881	280	280
Chicago–Kansas City						
Time	3 h 35 m		11 h	....	21 h 15 m	16 h 50 m
Fare	$45.75	$23.60	$22.04(x)	....	$8.00	$50.60
Miles	429		451	....	506	506
Chicago–Milwaukee						
Time	40 m		1 h 45 m	5 h	3 h 30 m	3 h
Fare	$10.00	$10.00	$3.81	$1.75	$2.50	$9.00
Miles	85		85	....	90	90
Chicago–Minneapolis						
Time	3 h 35m		11 h 35 m	....	17 h 20 m	15 h 45 m
Fare	$30.00	$30.00	$18.41	....	$10.00	$47.30
Miles	365		422	....	473	473

The rates quoted are the latest which came to our attention up to March, 1930. Rail rates include Pullman. Cost of private motor is figured at 10¢ per mile. On schedules showing more than 12 hours, many automobile tourists break the trip for meals and night lodging, making elapsed time materially greater than our figure, which is based on continuous driving at thirty miles per hour.

(x) Extra fare.

	AIR		RAIL	WATER	BUS	PRIVATE MOTOR
	July 1929	February 1930				
Chicago–St. Louis						
Time	2 h 30 m		6 h 30 m	....	11 h 15 m	10 h 30 m
Fare	$33.00(x)	$14.74	$11.91	....	$4.00	$31.50
Miles	268		284	....	315	315
Cleveland–Detroit						
Time	1 h 25 m		4 h 10 m	7 h 15 m	7 h 30 m	5 h 56 m
Fare	$20.00	$10.00	$7.06	$7.00	$3.50	$17.80
Miles	134		164	108	178	178
Cleveland–Kansas City						
Time	6 h 27 m		18 h	....	36 h	27 h 15 m
Fare	$93.50	$41.20	$35.07	....	$17.00	$81.70
Miles	749		791	....	817	817
Dallas–Oklahoma City						
Time	2 h 55 m		11 h 30 m	....	10 h	8 h
Fare	$21.00	$13.00	$12.27	....	$6.75	$24.00
Miles	248*		386**	....	240	240
Dallas–San Antonio						
Time	3 h 5 m		7 h 55 m	....	11 h	10 h 15 m
Fare	$31.00	$14.03	$12.75	....	$7.85	$30.70
Miles	289		291	....	307	307
Kansas City–Oklahoma City						
Time	4 h 10 m		9 h 25 m	....	15 h 20 m	13 h 30 m
Fare	$33.00	$18.00	$16.47	....	$9.00	$40.60
Miles	330		343	....	406	406
Los Angeles–New York						
Time	46 h 5 m†		78 h	320 h	147 h 47 m	99 h 16 m
Fare	$338.10	$159.93	$160.38(x)	$275.00	$70.00	$297.80
Miles	2,802		3,136	5,677	2,978	2,978
Los Angeles–Phoenix						
Time	3 h 20 m		12 h	....	18 h	17 h 35 m
Fare	$27.50	$29.25	$18.32	....	$13.50	$52.70
Miles	370		426	....	527	527
Los Angeles–Salt Lake City						
Time	6 h 10 m		22 h 10 m	....	27 h 40 m	25 h 10 m
Fare	$60.00	$45.00	$37.05	....	$17.50	$75.60
Miles	664		783	....	756	756

*Via Wichita Falls. **Via Sapulpa. (x) Extra fare. †Combination Air and Rail.

	AIR		RAIL	WATER	BUS	PRIVATE MOTOR
	July 1929	February 1930				
Los Angeles–San Diego						
Time	1 h 10 m		3 h 15 m	5 h	4 h 40 m	4 h 35 m
Fare	$15.00	$10.00	$5.30	$3.50	$3.00	$13.70
Miles	110		126	....	137	137
Los Angeles–San Francisco						
Time	3 h 15 m		12 h	19 h	14 h 30 m	15 h
Fare	$38.00(x)	$21.50	$20.04	$15.00	$10.00	$46.00
Miles	378		471	....	460	460
Montreal–New York						
Time	4 h		10 h	....	17 h	13 h 40 m
Fare	$50.00	$33.40	$17.56	....	$8.50	$41.00
Miles	334		376	....	410	410
New York–Pittsburgh						
Time	4 h 15 m		9 h 33 m	....	18 h	14 h 40 m
Fare	$45.00		$20.02	....	$10.00	$44.00
Miles	337*		440	....	440	440
New York–San Francisco						
Time	47 h 35 m†		78 h	378 h	147 h 17 m	100 h 16 m
Fare	$338.10	$181.43	$169.97(x)	$275.00	$70.00	$300.00
Miles	3,180**		3,168	6,101	3,008	3,008
New York–St. Louis						
Time	18 h 35 m†		23 h 5 m	....	43 h 30 m	35 h 20 m
Fare	$97.43	$53.43	$53.74	....	$21.00	$106.00
Miles	1,039		1,051	....	1,060	1,060
Oklahoma City–St. Louis						
Time	4 h 50 m		16 h 13 m	....	22 h 50 m	19 h 50 m
Fare	$47.00	$23.50	$25.53	....	$14.00	$59.60
Miles	470		542	....	596	596
Salt Lake City–San Francisco						
Time	6 h 30 m		22 h 40 m	....	29 h 45 m	26 h 15 m
Fare	$68.00	$68.00	$41.31(x)	....	$19.50	$78.70
Miles	624		819	....	787	787
San Francisco–Seattle						
Time	7 h 50 m		27 h 25 m	62 h	38 h 55 m	30 h 52 m
Fare	$80.00	$55.00	$46.67(x)	$34.00	$16.00	$92.60
Miles	720		954	926	926	926

*Via Philadelphia. **Via Los Angeles. (x) Extra fare. † Combination Air and Rail.

because greater care will be required in checking and testing before sale, it seems likely that airplane prices for several years will not reach the level of automobile prices, but with increased volume and less radical changes in design, prices for airplanes and airplane equipment are likely to become materially lower than the level of 1929 prices.

As air travel increases and cost of equipment decreases, we believe air travel eventually will reach rates below those of present first class rail travel. Several factors are likely to hasten the drop in air passenger rates.

Competition

Air transport companies are coming to see that at rates two or three times those of rail they cannot get enough patronage to take care of operation and overhead costs, and if they must for a time operate at a loss, they would do better to take the loss, carrying many passengers and building future good will.

Then, too, the air being free and there being no monopoly on possible terminal facilities, it is easy to establish air routes and numerous rival companies are likely to compete for patronage.

If the experience of railroad development is any guide, this may get into a price competition, which, like all price competitions, is likely to prove harmful to the industry and possibly call for regulation.

The protection of an individual transport company in such a competition, as in other lines of industry, is reputation developed by performance and by advertising. It would obviously be dangerous both to profits and to public safety for airplane service to be sold on price, for price selling leads inevitably to economies which in many other industries have proved disadvantageous and in the airplane industry might prove dangerous.

The Best Solution

The best solution for any transport company, so far as we can see, is to get prices as quickly as possible on a basis more closely comparable with first class rail rates, for without that we think it unlikely that a large volume market can be had, and then to compete with railroads and with rival companies on the basis of speed, comfort, service and safe operation.

DIVERGENT VIEWS IN THE INDUSTRY—RATE

Air transportation will hit its full stride before very long, and with that in prospect we expect to revise our rates downward, believing that the increase in traffic that may result from

a downward revision in rates will result in a greatly increased proportional gross revenue.
—Transport Company.

We have charged less than the average for passengers and have done very satisfactorily. I think prices are likely to be higher rather than lower. I think we could have built up to present level at higher prices and would have made money.—Transport Company.

Transport costs are too high. Airplane needs to be sold for less than rail, then it will get the crowd.—Engine Manufacturer.

I doubt very much if lower rates would be helpful in building up passenger traffic. We believe the development of confidence is a more fundamental factor. The public will pay a reasonable rate if they have sufficient confidence to take to the air.—Transport Company.

We are satisfied that price is a big factor in business. As the price approaches rail, business grows.—Transport Company.

Air travel too will appeal as more comfortable. Rates need to be higher and we need to give more comforts. No one objects to excess fare on Twentieth Century. Will pay extra for airplanes to save time and get comfort.—Transport Company.

Personally, I do not believe that the costs for operating a flying service will ever equal or come near the level of rail rates. If it be figured on the basis of costs, plus depreciation, maintenance and operating expenses, there will still be a wide margin in favor of rail rates. The factor, however, that favors air transportation is that of time saved and the consequent saving in labor hours.—Transport Company.

Until costs are gotten down by more effective methods of manufacture we cannot get our prices for transportation within reach. Within a year we expect to buy equipment for about half. That will enable low rates but we do not see possibility of equaling train rates for some time. Eventually air rates should be lower than rail—we have no roadbed or cement road to keep up.—Transport Company.

CHAPTER XV

TYPES OF HEAVIER-THAN-AIR CRAFT

THE aviation industry is in fact a collection of industries. It includes both heavier-than-air and lighter-than-air craft with entirely distinct groups of manufacturers and problems. Within the heavier-than-air division, the manufacturing and sales problems of a manufacturer of flying transport boats are quite different from the manufacturing and sales problems of a maker of open-cockpit landplanes.

It is not possible in this report to treat in detail the problems of each class. In this chapter presentation is limited to an enumeration of leading types of heavier-than-air craft and a mention of some features of construction with some of the advantages claimed for each and some of the limitations urged by competition. We do not have sufficient technical information to feel justified in expressing a first-hand opinion on trends in mechanical features and in this chapter we voice only what appear to us to be prevailing opinions.

In judging of trends in mechanical features, it should be borne in mind that factors other than mechanical superiority sometimes affect a trend. In the case of products of equal merit, advertising frequently creates a vogue for one rather than the other. Then, too, trends cannot be accepted as having any permanency unless they can be definitely attributed to human motives which have proved permanent influences in other industries. This is especially true in an industry where the attitude toward a mechanical feature may be changed almost overnight by a new invention.

Leading Types

Among the leading types of airplanes are:

Class 1—Landplanes:

Group A—Light two-place open-cockpit single-motored low horse power.

Group B—Light three or four place sport plane, open and cabin job, single-motored low horse power.

Group C—High-speed sport and mail plane, open and cabin job, single-motored, high horse power.

Group D—Transport plane, multi-motored.

It appeared to be the consensus of opinion that as far as can be seen at present, landplanes will be built along these general characterizations, each type having its specific field.

Light Planes

Under Group A, the light two-place open-cockpit plane, single-motored, from 60 to 100 horse power, will, it is thought, be used for preliminary training, individual airdrome flying, and short cross-country flights. The natural step of the individual owner after having been taught the fundamentals of flying and having obtained his pilot's license will be to step up into the next class, or the B Group.

This group will be a three or four place open or cabin job. It is thought probable that the four-place cabin job will be the more popular. It is predicted that it will be single-motored with a horse power ranging from two to three hundred. This type of ship will have a longer cruising radius than Group A and will permit the owner to take his friends and family on tours about the country.

High-Speed Planes

Group C, composed of high-speed sport and mail planes, according to the consensus of opinions expressed, will be single-motored, from three to five hundred horse power, open or cabin job. This type of ship will have a place in two distinct fields—one type will be bought by the class of people who are now buying the fastest and smartest automobile on the road and take pride in owning the fastest means of transportation available. Also under this group will be built the mail and fast freight planes. The prime requisite of this group will be high speed with safety.

Multi-Motored Planes

The next group, D, comprises the big multi-motored planes. The manufacture of this type will probably develop along several different lines from the twin-motored plane to a combination of motors, the ultimate size of the airplane being limited by the volume and the character of the traffic and by the relative operating efficiency of the larger sizes.

The multi-motored ship should be so designed that if it is twin-motored it can maintain a safe altitude and perform normally with either one of the two motors, or if more than three motors are used, that two motors may go dead and any combination of the remaining motors will maintain altitude and normal flying qualities with a full load. Transport lines will probably use several different sizes of planes. Since it would not be economical to send out a thirty-passenger plane with ten people when a ten-place ship could do the job as well and cheaper, transport planes will vary in size and distribution of loading, aiming to get the maximum return on the dollar invested.

Planes Other Than Landplanes

Class 2 includes five groups:

Group A—Light three or four place amphibian with low horse power.
Group B—Six to ten place single or twin-motored amphibian.
Group C—Large multi-motored amphibian.
Group D—Seaplane.
Group E—Flying boat.

Group A will probably offer a considerable field. This type will be small and will be built with a boat hull either open or cabin type. It will have a particular attraction for people living along coastal waters and the inland waterways of the Middle West. This type of plane has advantages over the strictly land or sea plane, but has the handicaps of greater expense and less performance than land or sea planes of equal grade. However, the amphibian's ability to alight on land or water, thereby increasing its safety of operation, and the convenience of this type, to a considerable number of people will warrant the added expense of amphibian gear and some loss of speed and performance.

Six to Ten Place Amphibians

Group B of this type will have two distinct fields. First, the flying yacht for the man of wealth, who at the present time has his private yacht that is in use in and about Long Island Sound and the New England Coast in the summer, and Florida and the West Indies in the winter. This type of craft will in many cases have elaborate fittings and appointments for the class of people who can afford, and will pay for, extra comfort and safety.

Another field for this type will be in feeder lines to the big flying boats, perhaps connecting Chicago and the Midwest States through the inland

waterways system to a big flying-boat line operating from New Orleans to Central and South America, or again, down the Atlantic Coast to Miami or Key West, connecting with a boat line to South America. Also, it will probably be used in inter-island service in the West Indies and the Hawaiian Islands.

Multi-Motored Amphibians

Multi-motored amphibians will have to compete with flying boats for long-distance transport over water. The weight and drag of the amphibian gear necessary to handle a boat of this size will be a handicap and many believe that the large amphibian will not be able to compete with either the flying-boat type or the large multi-motored landplane. The necessity for amphibian gear, it is argued, is not so great as in the single-motored planes, where it provides for the hazard of forced landing, which should be rarely necessary in the multi-motored plane. However, there may be some intercity hops in which it will prove advantageous to have amphibian construction with an airport in one city and a seaport in the other.

Seaplanes

Seaplanes are similar to landplanes except that pontoons replace landing wheels. The pontoons obviate the necessity for specially constructed hulls. Seaplanes can be built in various sizes, and used whenever the service is over water and a boat hull is not required by possibilities of exceptionally rough water. As a matter of fact, the landing gear of practically all landplanes may readily be changed either for use on water with pontoons or on ice and snow with skis.

Flying Boats

A flying boat has a boat hull built to withstand rough water. It carries no landing gear. It is thought that flying boats will be of one description—namely, the large flying boat for long-distance transportation over water. It is evident that there is a definite use for the flying boat and efforts toward its development can be expected. The same limitation on size holds true with the flying boat as with the large land transport plane, the size being determined by the volume and character of the traffic. From a design standpoint, it is claimed that the flying boat can carry a greater pay load per horse power than a large landplane, and it seems possible that flying boats larger than landplanes may prove profitable units.

There seem to be possibilities for successful operation of efficient coastwise flying-boat lines. First, because they will be competing with a much slower means of transportation—namely, the steamship; second, the flying boat under ordinary conditions is safe to operate. Its route being over water, the flying boat has a landing field available at all times and under reasonable conditions it can make a safe landing. The aim in building future flying boats will be to produce seaworthy craft. Whether flying boats will develop rapidly enough in the near future to warrant transoceanic travel is problematical. If seadrome servicing stations prove practical, the use of flying boats for trips across the ocean seems feasible. In that case the saving in time will be great enough to insure a market. Unless some mid-ocean servicing arrangement can be perfected there will have to be considerable change in design before passengers can be carried to Europe, and here they will be competing with lighter-than-air ships which seem at the present stage of aviation development to offer the better means for flying across an ocean. For coastwise travel, on the other hand, flying boats present possibilities of successful lines.

Monoplane Versus Biplane

Opinions on relative merits of monoplane and biplane differed. Some contended that the tendency of airplane design for the past few years has been toward the monoplane type of construction. It is claimed that for any given airfoil the monoplane is more efficient. It can be built, it is claimed, with cleaner lines than the biplane, eliminating considerable external bracing, thereby increasing the speed and the performance of the ship. However, the proponents of the multi-plane system contend that the structural advantage of the biplane makes possible the use of a more efficient airfoil and the achievement of structural strength on a smaller weight. The issue between the monoplane and the biplane is by no means settled, and it is possible that advertising may be a factor in winning the public's decision to one or the other.

Airplane Engines

Divergent views were expressed as to the future type of airplane engine. Some believe that the radial type will maintain a permanent and strong position. Others claim that the radial air-cooled engine has nearly reached its limit of development in horse power and size, and say that to go beyond the present horse power will greatly increase the size of the engine and the head resistance offered when installed in the plane. In the larger horse powers,

some contend that the tendency is to in-line air-cooling and also to a return to the liquid-cooled type using vaporized cooling or high temperature chemical cooling.

Diesel Engines

Some see a considerable future for the Diesel engine because of the economy of operation and the elimination of a number of accessories now necessary in the present-day airplane motor. The Diesel engine now weighs more than the gas engine but has a better fuel economy. Hence, it is argued that for long flights, requiring large quantities of fuel, the Diesel may prove better as a load carrier than the gas engine. Another advantage claimed for the Diesel is the lessening of fire hazard, due to the absence of an ignition system and to the use of a low grade fuel, which is less volatile and less inflammable. It is also claimed for the Diesel engine that it interferes less with radio reception and transmission.

Upon one point all agree, namely, that much engineering thought and effort is being directed to the development of engines, and that it is possible that radical changes in design may result.

All-Metal Versus Wood, Metal Tubing and Fabric

A wide divergence of opinion was expressed as to the relative value of all-metal, compared with wood, metal tubing and fabric for airplane construction. The proponents of all-metal declared that metal decreases fire hazard and that as the industry gets on a quantity basis and able to use automatic machinery, metal will be universally used. The proponents of wood, metal tubing and fabric, on the other hand, claim that there is no greater fire hazard with these materials than with all-metal and declare that with this construction greater strength in proportion to weight can be obtained, and that in case of minor mishaps to a plane a repair is more easily effected.

We will not attempt to express an opinion as to the merits of this moot question, but we believe the Ford advertising has created considerable popular preference for metal airplanes. The factor to decide this question may be advertising.

Fully Equipped Planes

It is thought that planes will follow the trend of automobiles in adding full equipment of starters, brakes and other accessories which can contribute materially to safety, comfort, and ease of operation.

Autogiro

The autogiro has a windmill-like attachment which is not connected with the motor and gets its rotary motion solely from the forward motion of the plane and from the wind current developed by the plane's propellers. This attachment exerts a buoyant force and makes possible a material shortening of the wings.

Opinions of those with whom we discussed the autogiro varied widely. It is claimed for the autogiro that in case the motor fails it will settle down instead of crashing and that the impact with the ground will not be much greater than if descent were by parachute. It is claimed that the autogiro, by getting up rotary motion of the giro attachment through utilization of the wind currents created while warming the motors, can take off in half the distance of a standard plane of equal size. It is thought by the proponents of the autogiro that a vacant city block will be of sufficient size for landing and take-off and that this ability to land in a small space can be accomplished without serious loss of efficiency, perhaps with as little loss as 10 per cent or less. It is claimed that operating an autogiro is easily learned and that after a few hours' instruction a student will be able to do solo flying safely.

Some who saw the demonstration at the Cleveland air races expressed a belief that the principle would too greatly impair efficiency and that the industry must look to the development of the standard type of plane for more satisfactory performance. Others who saw the demonstration were impressed by the principle and called attention to the long and intensive engineering effort which has been applied to the standard type of plane compared with the little thus far expended on the autogiro. They expressed a belief that the principle might be developed to accomplish what is claimed for it.

We cannot express an opinion on the engineering problems presented by the autogiro, but from a market standpoint it seems clear that a sacrifice of 10 per cent of efficiency to secure materially greater safety and ability to land in small fields would not be a serious handicap. If a day comes when the autogiro accomplishes all that is claimed for it, we believe it will revolutionize the potential market for individually owned planes.

Helicopters

The helicopter differs from the autogiro in that power is applied to the windmill-like attachment, thus enabling almost vertical ascent and descent. The helicopter appears to be little in the thinking of those with whom we

talked, but experimental work is still being applied to the principle and it is probably too soon to count the helicopter out of the race. It is possible that the helicopter principle, either used alone or in conjunction with the autogiro principle, may at some time be a factor of importance.

Gliders

Gliders have the advantage of extreme lightness, but lack of motor power presents obvious limitations. They have a place in the field of sport, are valuable in the training of pilots, and have demonstrated that they can enable a pilot to descend from a dirigible. The ability to glide down from a dirigible may prove of military and possibly of some commercial advantage. Apparently the glider will win a permanent niche in sport and in training.

Mechanical Future

Speaking generally of aviation, one cannot at this time safely predict its mechanical future. A great deal of engineering thought and experimentation is being expended on every phase of the industry, and it is quite possible that the favorite plane of 1940 may bear little resemblance to the leading planes of 1930.

DIVERGENT VIEWS IN THE INDUSTRY—Types and Design

Everything current in airplanes will be obsolete within two years.—Plane Manufacturer.

Aircraft design and construction are bound to undergo some change or modification. I believe, however, that the general appearance and form will remain somewhat as we have them today.—Plane Manufacturer.

The present type of airplane is no more a stable product than was the automobile in horseless carriage days.—Plane Manufacturer.

In type I doubt if there will be many changes. From an aerodynamic standpoint the ships of the future will in appearance be similar to those of today.—Plane Manufacturer.

Nobody knows what an airplane of the future will be like. We must be constantly alert to improvements.—Plane Manufacturer.

There may be, as time goes on, a great many innovations such as the autogiro and other types of devices, but I believe that fundamentally the airplane of the future is going to be a refinement of the airplane of today . . . There is a possibility that an autogiro type of device may have a place in a certain type of slow-flying, slow-landing ship, but I rather believe that a large number of aircraft in the future will be more or less of the orthodox type of ship as we know it today.—Plane Manufacturer.

We believe that flying boats will make up a very important part in the future development of aviation and will be much more important in the future than at any time in the past.—Plane Manufacturer.

It seems to me that it will be a great many years before there will be any demand in this country for the large type of flying boats carrying over a hundred and fifty passengers.—Manufacturer of Planes.

Autogiro

One of the big factors that will limit the development of the industry is the difficulty of learning to fly. Because of that I believe there may be a great future for such a plane as the autogiro. It naturally will need to be much better perfected than it is today and will have to be adapted to various types of aircraft, but the principle has merit and it is natural to believe that a device of that kind or similar nature will be needed to simplify flying.—Plane Manufacturer.

I have watched the autogiro development with interest. It will not prove practicable. Of that I am convinced. It will undoubtedly get a lot of promotion and some who are seekers for a novelty will take it up, but it has too many limitations to be useful.—Manufacturer of Planes.

We are watching with much interest the development of the autogiro. It seems to us to have considerable possibilities.—Parts and Accessories Manufacturer.

Take the autogiro, for instance. It is only a novelty. There is no real possible future for such a contrivance because it is not in conformity with known and accepted aerodynamics. It will have a vogue with some for a while and will arouse interest, but it will not supplant the regulation type of aircraft construction.—Advertising Agency.

My personal belief is that the autogiro when further developed and adapted may be used to great advantage, especially on airships of smaller size. It is doubtful if it will ever be practicable as applied to a heavier type of aircraft.—Plane Manufacturer.

The autogiro principle is mechanically all right but I don't believe it can be made effective from a practical standpoint. It slows up speed too much. I know they claim it only cuts speed a little but that is based on the cut of a slow-speed ship. In my judgment anything that tends to cut down speed is not going to work out. The trend and need are for greater speed.—Manufacturer of Planes.

Radial Versus Straight-in-Line Engines

In my opinion the tendency in motor development will be toward straight-in-line chemically cooled motors. The radial type has about reached its maximum development. It is not practicable as it offers too much resistance.—Plane Manufacturer.

We believe radial engines are better for small engines, at least. They are more simple in construction. That they cause more drag has not been proved. To properly cool cylinders in line they use deflectors to turn air over cylinders and that causes as much drag.—Manufacturer of Engines.

We believe the straight-in-line air-cooled motor is the ideal airplane motor. It is more efficient because it does not have the air resistance of the radial type and it can be serviced

by 99 per cent of the good engine mechanics in this country. The radial type motor loses power—20 per cent of its power is spent in pushing itself against the air.—Manufacturer of Engines.

We believe the air resistance that is an objection by some against the radial type is not sufficient to rule out the efficiency of the radial of about 200 horse power but do not know yet what we had best do in motors of greater horse power.—Engine Manufacturer.

In our opinion the question of efficiency and economical operation will govern the type of motor as between radial air cooled and in-line chemically cooled. A ring bearing, for instance, in a radial air-cooled engine can be replaced for $20, whereas a ring bearing in an in-line chemically cooled engine will cost $150 to replace.—Engine Manufacturer.

Diesel Engines

The Diesel engine, because lacking in ignition system, has less fire hazard and is easier to insulate for radio reception. These seem to me the only two things the Diesel engine really has to offer. Its lower fuel cost can probably be met by development of the regular type of engine, as can also its dependability.—Engine Manufacturer.

The Diesel engine principle seems to have much promise but probably cannot be applied advantageously to engines of less than 300 horse power because of weight.—Engine Manufacturer.

CHAPTER XVI

TYPES OF LIGHTER-THAN-AIR CRAFT

THE round-the-world cruise of the Graf Zeppelin was impressive. The series of long-distance flights of this airship demonstrated that a large airship is capable of navigating in unfavorable weather; that it can cross the oceans safely and that it offers an opportunity for commercial passenger, mail and express lines to Europe and to the Orient.

A lighter-than-air craft, like a ship, depends on power only for progress and to maintain sufficient speed to make steering rudder effective. It can slow down in fog; can go out of its way to avoid storm without exhausting fuel supply and can keep afloat in the air without any power. On the other hand, the application of power as it pushes an airship forward gives it a dynamic lift which supplements the static lift of the gas and thus increases buoyancy of the ship.

There are five types of lighter-than-air craft.

1. Balloons.
2. Non-rigid airships or "blimps."
3. Semi-rigid airships.
4. Rigid airships or "Zeppelins."
5. Metal-covered airships.

The Balloon

The balloon carries no motor. It is merely a bag filled with gas lighter than air, covered by a net from which hangs a basket for pilot and passengers; and a valve by which gas can be allowed to escape, causing the balloon to settle.

Balloons have been used for more than a century, were of value in the Civil War and played an important part in the World War. Having no motive power a balloon can go only with the wind and hence balloons have only limited uses. They have, however, proved of value in observation and in training. The balloon ascension with the trapeze performer and parachute jump has thrilled several generations of youthful Americans. The balloon still has military value and commercially remains interesting and of service for stunts of various kinds.

The Non-Rigid Airship

The non-rigid airship or "blimp" is essentially a balloon driven by a motor. It has a single gas bag shaped to reduce resistance when driven through the air and has closely attached to the bag a cabin, carrying pilot, passengers and motor. In order to land a dirigible airship, it is not necessary to let gas escape, for the ship may be nosed toward the ground and driven down by its motors to where the ground personnel can catch and hold it.

The blimp is the least expensive type of dirigible and has a number of military and commercial uses. It may be used for observation, photography, advertising or pleasure trips. It furnishes a comfortable and pleasant mode of travel and while its use up to the present has been chiefly by the Government and by private corporations, it is possible that in the future some individuals of wealth may find a small airship a desirable supplement to motor cars and yacht.

Semi-Rigid Airships

The semi-rigid airship has a metal keel extending from end to end with a metal nose and metal tail. The cabin for pilot, passengers and motor is attached to this keel. The semi-rigid airship can be built larger than is practical for a blimp and can safely utilize greater motor power and hence can attain greater speed. The semi-rigid airships occupy an intermediate position between "blimps" and "Zeppelins" with some of the advantages of each. They have military uses for training and other purposes. Commercially the market appears to favor either the blimp as the smallest and least expensive unit or the Zeppelin as the most efficient for transport work. It is, however, quite possible that if lighter-than-air craft be adopted by individuals for private use, the semi-rigid, because of its greater speed and better ability to combat unfavorable winds, may find a place in the commercial market.

Rigid Airships

The rigid airship or "Zeppelin," named after Count Zeppelin, who developed the type, has a metal framework in which a number of gas cells are installed. With this arrangement it is possible to install within the frame, quarters for passengers and crew and rooms for the motors, leaving outside the main bag only propellers, steering apparatus and navigating quarters. This is more likely to be done in American ships where non-inflammable helium gas is used than in foreign ships which use hydrogen gas.

The rigid dirigible furnishes a promising solution to transoceanic transportation—so far as we can see at present, the most promising. It is possible that if seadromes can be successfully operated in mid-ocean, flying boats may challenge the supremacy of the dirigible in this field. The flying boat presumably would have an advantage in speed over the dirigible which would put it in a favorable position to bid for mail and express contracts and would appeal to those to whom speed is a paramount consideration.

On the other hand, a giant dirigible presumably can offer greater comfort. In a dirigible of the size of the two giants now being constructed by the Navy, there will be space for rooms not unlike those in a modern steamship, looking out on promenades five feet wide and aggregating 900 feet in length. There can be dining and recreation rooms and, in helium-inflated ships, smoking rooms. In fact, such an airship can offer travel comforts now furnished only in a first-class ocean liner. It is claimed by proponents of airships that they will be even more comfortable than steamships.

Metal-Covered Airships

A small metal-covered airship has been built for the Army and it is claimed that metal airships of three million cubic feet capacity can be successfully constructed.

The metal sheet used for covering is laminated. A thick sheet of duralumin is covered on both sides with a thin sheet of aluminum and the whole rolled into a thin sheet for the shell. The advantage of this arrangement is that aluminum is less subject to corrosive action than is duralumin.

The proponents of metal airships claim for the metal ships small gas leak, small drag because of the smooth surface of the metal, strength, small likelihood of puncturing the shell, speed and ability to turn in short radius. They claim that the metal airship is especially advantageous for use in the tropics, stating that the metal covering is little affected by the actinic rays of the sun. They state that the shell of the dirigible gains strength from the force exerted on it by the gas bags within, illustrating their statements by reference to a football which becomes more able to stand hard usage when the inner sack is inflated.

With metal airships passenger cabins and engine houses will be attached below the hull instead of within the frame as with the giant fabric ships. It is stated that the metal ship can be anchored in water of reasonable depth by four anchors and that when so anchored it will be able to outride any storm short of a hurricane.

It is stated that a metal airship can be built with sufficient speed so that it can be convoyed advantageously by airplanes, refueling the planes from time to time with gas carried as cargo. Equipment, it is stated, can be installed so that two airplanes at a time can fasten to the dirigible for refueling.

The attitude of some observers appears to be to withhold judgment on the merits of the metal airship until a large one has been constructed. It is possible that a large metal airship may be built sometime within the next two or three years either for use of the United States or for some South American government.

Advantages of Dirigibles

A steamship, it is argued, being partly in the water and partly in the air, is subjected to greater strains than is a craft in either element alone. A large dirigible, therefore, it is argued, is less likely to occasion seasickness than is even a very large steamship.

The comparative safety of the dirigible and the flying-boat seadrome service probably would be debated by the proponents of each. The proponents of the dirigible state that although more than 34,000 passengers were carried in dirigibles in Germany before the War and several thousand have been carried in Europe and the United States since the War, no passenger in a dirigible has been killed or seriously injured. They also call attention to their ability to remain aloft with injured motors, to travel far without fuel shortage, to circumnavigate storm areas if necessary and they point to their demonstrated ability to outride unfavorable weather.

On the other hand, the proponents of flying-boat seadrome service can argue that with seadromes every two hundred miles across the ocean it will be possible to have accurate weather information for a two-hour flight ahead and thus to enable a hop from one station to the next with assurance of safe flying weather and with the further assurance of safe sea in case mishap forces the plane down.

We cannot attempt to prejudge this controversy. Until the practicability of seadromes in mid-ocean is demonstrated, popular opinion is likely to favor the dirigible. In case the seadrome proves practicable, there is likely to be a place for both services—the airplane for swifter travel, the airship for greater roominess and comfort—and, as discussed elsewhere, in passenger travel, comfort, we believe, appeals to more people than does a little greater speed. In case both methods prove practical, selling as well as performance may be a factor, and priority in winning confidence may prove influential in securing the major part of this market.

Size of Rigid Dirigibles

As dirigibles increase in size, it is stated that they increase more than proportionately in pay-load capacity and in distance which can be traveled without refueling and also in the room which can be allotted for the comfort of passengers. Hence there is a tendency toward larger and still larger airships.

The Goodyear Zeppelin Company has completed an airship dock 1175 feet long, 325 feet wide and 211 feet high, with an uninterrupted floor area of 364,000 square feet. In this huge building two Washington Monuments could be laid end to end. In this dock will be built two airships contracted for by the United States Navy, which will be the largest thus far built. These airships will have nominal gas capacity of 6,500,000 cubic feet, which will be almost one-third greater than that of the new British airships, almost twice that of the Graf Zeppelin and approximately two and a half times that of the Los Angeles. They will be built so as to house within the frame eight engines, quarters for the crew and five fully assembled airplanes with a trap through which the airplanes may be sent forth and brought back.

Even larger ships—more than four times the size of the Los Angeles—can be built within this dock, and it is believed by some that it is practicable to build and operate airships six times the size of the Los Angeles.

It is agreed that the present lighter-than-air ship is not fast enough. The ships now being constructed for the Navy will have a maximum speed in excess of 80 miles per hour and at about 55 miles per hour will be able to travel more than 10,000 miles without refueling. It is believed by some that airships of the future will have a cruising speed approaching 100 miles per hour.

Passenger Transport Routes

The ships being built for the Navy are believed to be well suited in design for passenger use and it is thought that the construction of similar ships for transoceanic use will follow the completion of the Navy contracts.

It is believed that the Pacific offers the most favorable route for initial passenger, mail and express service, because weather conditions over the Pacific are more dependable than over the Atlantic and because distances are greater.

With air service successfully established across the Pacific, service to Europe would probably soon follow. Since air conditions are less favorable across the northern steamship lanes, it is possible that a transatlantic line may find it preferable to go, possibly from some Southern city, via the Azores and Spain.

Meanwhile, the British Government has a program of government-built airships to operate between England and Canada and between England, Egypt and India.

What the cross-continent possibilities may be for airship lines is not at the present time clear. Airplanes will, so far as we can foresee, always have an advantage over airships in speed, and as airplanes improve in comfort and in safety of operation, the airship will have less extra advantage to offer. Yet the giant dirigible can, so far as we can foresee, always offer more roominess and a kind of comfort not practicable in planes; and it should be borne in mind that comfort is a primary consideration with many travelers.

It is quite possible that a time may come when airships will offer the most luxurious form of travel and at a rate not prohibitive in comparison with best rail transportation. If so, it is quite possible that an airship line may operate successfully from some point on the Atlantic Coast to some point on the Pacific Coast. While it is conceivable that transcontinental airship lines may in time connect various cities of the two coasts, the major overland opportunity appears to be in one main transcontinental route with airplane feeder lines to the points of most satisfactory operation.

For the most part, airships and airplanes are not competitors. They supplement each other. The airship can operate economically over long distances and needs airplane coöperation to concentrate and distribute its passengers.

In 1929, the United States Navy conducted experiments attaching a heavier-than-air ship to the Los Angeles. The tests were satisfactory and proved that it was feasible to attach an airplane to a moving airship. It is thought that the future lighter-than-air ships, both military and commercial, will be so constructed as to enable them to attach heavier-than-air craft while in flight.

The military advantage is clear. There are also commercial advantages. Planes can catch a dirigible after it has started a transoceanic trip and deliver to it mail, air express and belated passengers, and in turn the dirigible as it approaches the other side can be met by planes to speed the landing of mail, express and passengers who are in a hurry. In transcontinental trips, airplanes can be used to land and receive mail, express and passengers at intermediate points.

The most serious limitation of an airship is that it takes a large crew of trained men to moor or land a large dirigible. This means costly terminal facilities and expensive ground organization and apparently limits the profitable operation of large lighter-than-air craft to long trips such as across the ocean or across the continent.

This handicap may, it is felt, be partially overcome in two ways. First, it is thought that airship lines may operate from mooring masts and go to a

hangar only for periodic overhauling, just as a steamship goes to drydock. Second, means for mechanical handling may be developed. At Lake Constance, where the German Zeppelins were built, air conditions were especially favorable for handling dirigibles and an abundance of man power was available. Hence, little thought was given to handling a dirigible by machinery. But in America weather conditions often present difficulties and it is expensive to mobilize enough men capable of handling a giant ship. Hence, in America a mechanical solution is being sought for the problem and great strides for improving ground facilities in the near future can be expected. It is believed that with the further development of mechanical means for handling airships on the ground, the ground organization can be greatly reduced, permitting economical operation of a line of airships.

The chief commercial problem of airship transportation is the same as that of airplane transportation. To get ready to send one ship across a route takes expensive port facilities and personnel and executive overhead. A profit cannot be made by sending an occasional ship. A price which would make an occasional ship pay will discourage patronage—only by having frequent ships going each way can dividends be earned on investment. An occasional transoceanic mail and express service would be of little use. Only as a frequent and regular service is established can patronage be obtained for those services. An occasional ship for passengers is an interesting stunt but cannot return much profit. Only as a regular and frequent passenger service is established can a profitable passenger business be conducted.

In the case of transoceanic routes, to make the mail and express service of real value, there appears to be need for at least two ships a week each way. In transcontinental service, if for passenger service only, possibly two or three times a week each way might attract patronage, but for a share in express or mail and for a full development of passenger service a ship each way daily seems to be required.

Rates for Airship Travel

When the time comes to install airship service on a regular basis, it will probably be found practicable to obtain an extra rate for air mail and air express, for the saving in time will clearly be worth additional cost. To develop satisfactory passenger business, it will probably be found necessary to offer a rate not excessive with reference to other forms of transportation and also probably necessary to educate the public to the advantages of airship travel.

It must not be inferred because reservations on the Graf Zeppelin for its initial trips were in great demand that the public is really eager to adopt airship

travel. First trips for any important route will sell at a premium, but steady patronage will require development. Probably a price differential will not be so serious in transoceanic as in transcontinental service. In the first place, people are already accustomed to wide variations in cost for different classes of service in transoceanic travel and for different locations of rooms on a steamship.

In the second place, the saving in time will be greater over the water than over land, and in the third place, if practical experience of transoceanic travelers produces popular conviction that airship travel has greater freedom from sickness than travel on the water, an extra rate can be successfully maintained. However, since many of those who purchase expensive transoceanic travel will doubtless continue to prefer great steamships, it will probably be found necessary to make airship rates materially less than double the cost for corresponding steamship accommodations to build up a dependable clientele for ships twice a week.

The United States is believed to have a monopoly on helium for commercial purposes. While helium is found in many parts of the world, only in the United States has it been produced at a cost making it practical for commercial airships. This, it is believed, will give the United States built airship a decided advantage over the hydrogen-inflated ship at present used by foreign countries, due to the safety factor involved in using helium. Such an advantage, however, will be lessened if, as some think probable, a method can be developed by which hydrogen gas can be rendered non-inflammable without its efficiency being materially reduced.

In hydrogen airships, it is deemed necessary to place motor rooms and cabins outside the frame, thus increasing the "drag" and making it more necessary to limit the size of passenger quarters.

Future for Lighter-than-Air Craft

In a study of aviation, one cannot escape a conviction that lighter-than-air craft have a promising future. That future, however, appears to be a few years ahead rather than immediate, due to the great cost of huge docks, which are essential in building giant dirigibles, the great cost of the ships themselves and the present cost of the helium to fill them. The United States Navy has performed a splendid service in making possible the building of rigid dirigibles, in helping to perfect their designs and in determining best methods for their navigation and ground handling. Out of this is likely to come a transport industry of major importance.

CHAPTER XVII

PARTS AND ACCESSORIES

Engines

ENGINES perform a unique function in airplanes. In other motor vehicles they furnish only motive power and heat; in the airplane they alone keep the plane in normal flight. Hence an engine manufacturer has a much greater opportunity of winning and holding a consumer preference—in fact, a consumer demand—for his product than he has had in any other industry.

A purchaser of an automobile may be persuaded to take an engine other than one of his preference, but the purchaser of an airplane, conscious that his safety depends upon the engine, can be made more steadfast.

The next year or two are likely to be potent in determining whether airplane purchasers will express personal choice of engines or whether they will accept whatever the plane maker suggests. During the past year a number of plane manufacturers let the purchaser choose one out of several engines and adapted his fuselage to meet the requirements of the engine preferred.

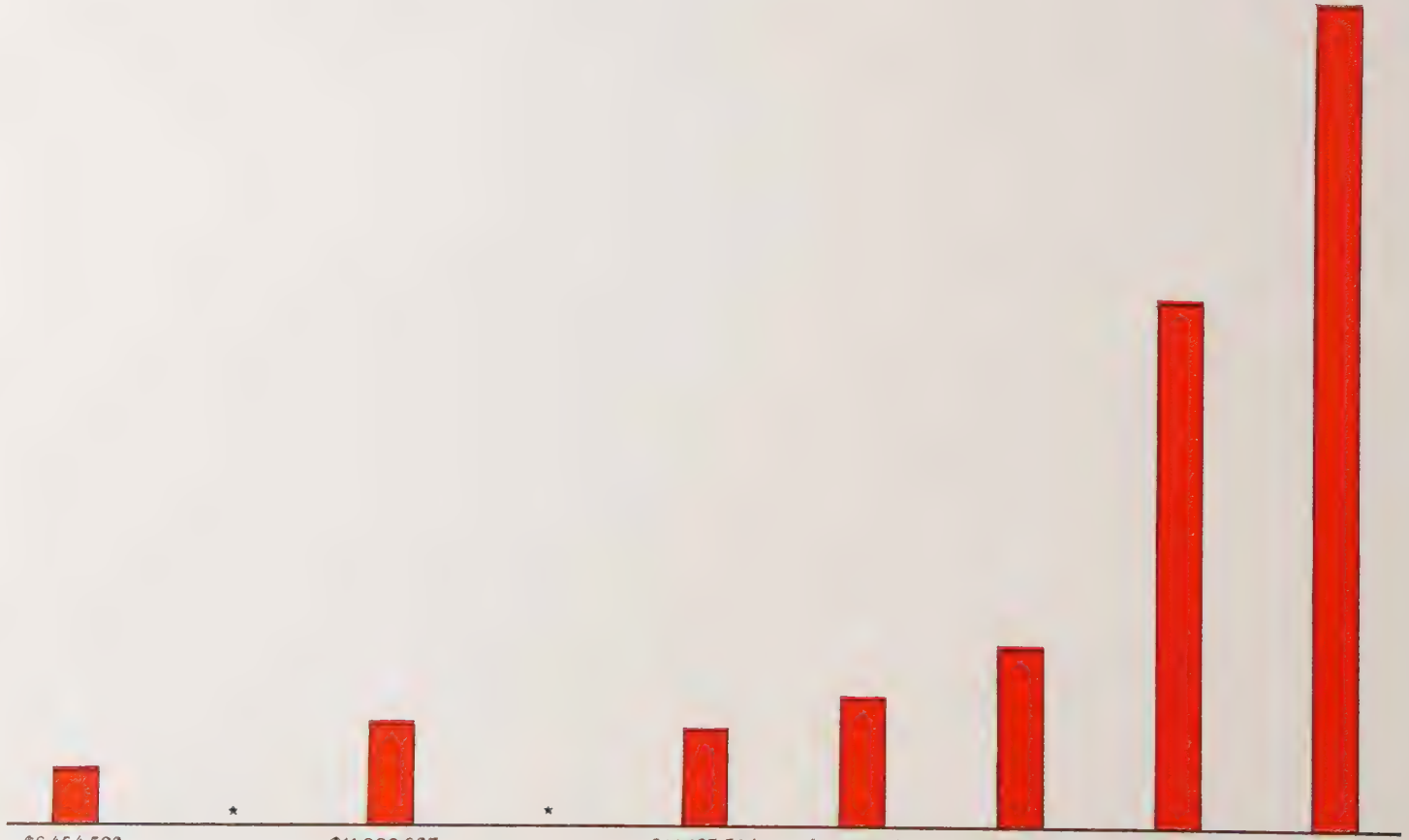
But thought among manufacturers appears to be tending toward making their fuselage to fit one particular make of engine, and quite possibly, on the part of some who look forward to quantity production, there is the thought that some day they may produce their own engines.

There is at the present time an unusual opportunity through advertising to gain consumer attention for a plane's motor, to win an acceptance which will make the engine a sales asset to any manufacturer who adopts it, and to increase the sales resistance of any plane equipped with an unadvertised product.

There is another reason for an engine manufacturer to advertise. He knows the great precision with which an airplane engine must be made—he knows that an airplane engine must be made to run at almost full speed nearly all of the time it is in the air, while an automobile engine may be called on to exert itself to capacity not more than ten per cent of its hours of service—he knows that all this would not be so difficult if weight were no factor—but he knows that he must produce an engine with the contradictory requirements of

PRODUCTION—TOTAL VALUE

PLANES, ENGINES AND PARTS



*1922 and 1924—No Figures Compiled

1921 – 1927 – Census of Manufactures

1928 –1929— From Aircraft Year Book for 1930, Published by Aeronautical Chamber of Commerce of America, Inc.

minimum weight and maximum efficiency and reliability, and he knows it costs considerably more to produce than an engine of equal efficiency for automobile use. The public knows little about all this, and the reaction of a man who for the first time learns the cost of an airplane engine is that the price is out of reason. Education of the public as to what is involved in the making of an airplane engine will do much to enable a manufacturer to maintain his quality when price competition starts to force price below the level at which quality can be produced.

Other Parts and Accessories

What is stated above concerning engines is to a considerable extent true of many other parts and accessories. Since a man instinctively feels that he takes a risk when he leaves the ground, every part of a plane challenges his acute attention. There are many who are not content to leave blindly to a plane manufacturer the selection of the parts and equipment upon which their safety depends. Many would like to know about the instruments, brakes, starters, ignition system, fire protection and other safety devices and accessories.

In many cases interest in a certain part or accessory is only latent—it has not been much in the consciousness of the plane prospect. Advertising can make that latent interest an active one. Any manufacturer of a part or accessory of superior quality has an opportunity through advertising to win public recognition of the merit of his product and hence win a protection against competition of inferior products on a price basis.

In the absence of public recognition of merit, it is always difficult for a manufacturer to combat price competition and to withstand the temptation to take a little out of quality in order to reduce his price. National advertising furnishes the means by which a manufacturer can make that which will furnish maximum safety, without endangering his markets.

The buyers of airplanes are for the most part young men who are keenly alive to advertising and believe in advertised merchandise. They can be reached through advertising by a manufacturer of an important part or accessory if the merit of his product will stand the searching test of publicity. By winning appreciation for his product, a parts or accessory manufacturer can build a sales asset for any plane manufacturer who may use his product and hence can build for himself permanent markets for the quality product he desires to make.

The next few years will be the formative ones in the aviation industry. In these years recognition for meritorious products can be won more easily than at a later time. After thought and buying methods become more crystallized, such recognition can be secured only at large expense.

AIRWAY MAP OF THE UNITED STATES

PASSENGER ROUTES OPERATING AS OF DEC 31, 1929

PASSENGER ROUTES SCHEDULED BUT NOT YET OPERATING

OTHER AIRWAYS

DEPARTMENT OF COMMERCE, AERONAUTICS BRANCH

CHAPTER XVIII

AIR EXPRESS

AIR express appears to us one of the largest, perhaps the largest, potential for profits in the aviation industry. In transportation of merchandise it is certainly true that time is money, and air express which has the possibility of being the quickest service has an opportunity, as we see it, to develop a consequential volume at some advance in rate over rail express and to add materially to the profits of transport operations.

Express is not subject to many of the handicaps of passenger air transport. The element of personal fear is lacking. There is no necessity for more than one motor. A single pilot may take the ship. A chance on bad weather is not so damaging to the service. The plane does not require ornamentation. Terminals do not require reception rooms and restaurants.

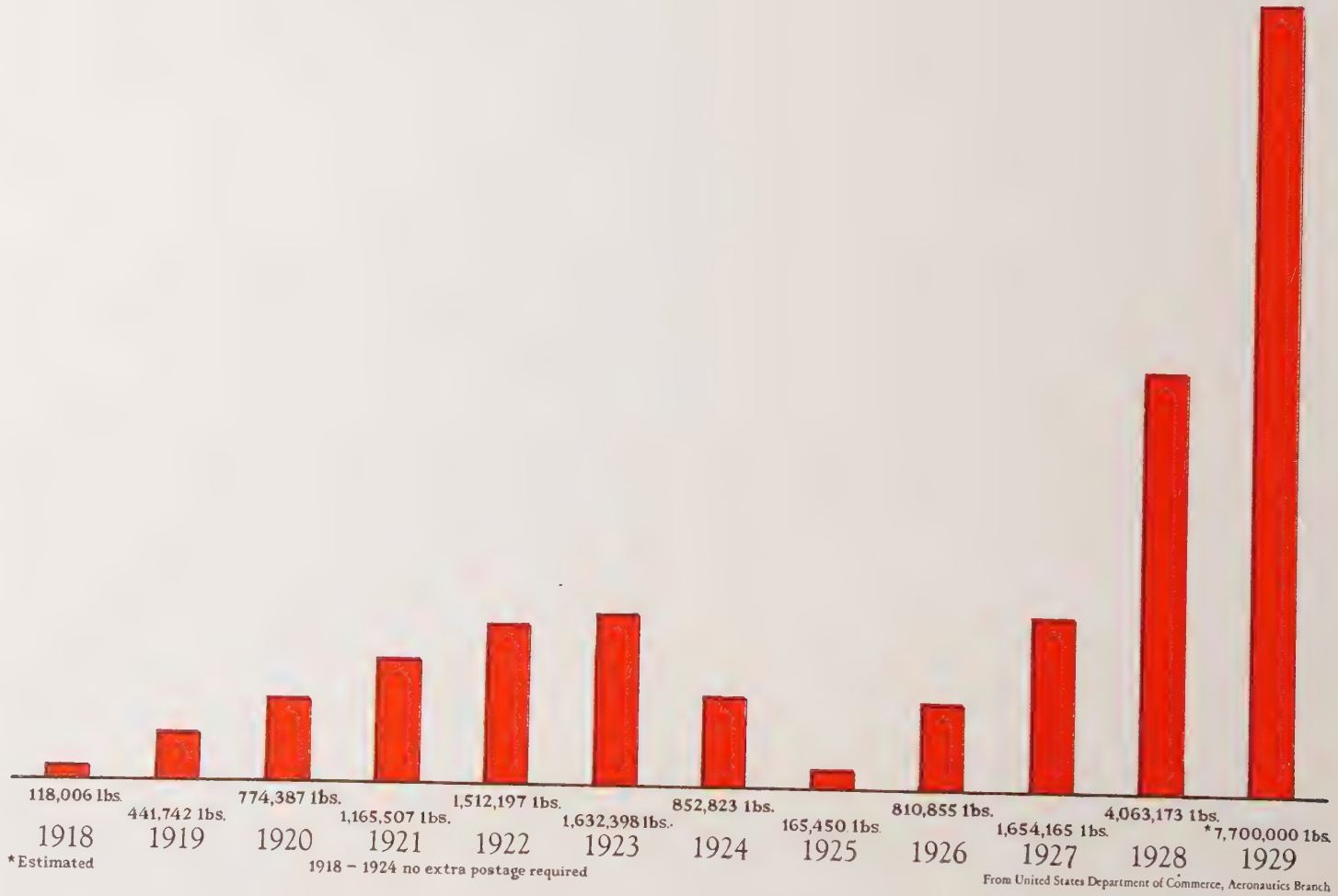
On the other hand, the service does require an expeditious collection and delivery service. If that which is gained en route is lost by inefficient handling at terminals, business cannot be builded.

The importance of air express in terms of profits comes from the fact that expense for terminals, hangars, planes and executive overhead has to be incurred before there can be air transport of any kind, and that these items of overhead need not be greatly increased to add express to passenger service.

More Hours From a Plane

The mechanical development of the industry is so rapid that a plane is likely to become obsolete before it is worn out. Air express offers an opportunity of more hours per year for a plane. For example, let us suppose a company with a school and passenger hop service has bought planes at $7,500 and depreciates them on a three-year basis for $2,500 per year. If these planes have a working capacity of 500 hours a year for three years it would be a depreciation of $5 per hour. But if these planes are used profitably only 300 hours a year, on the basis of depreciation at $5 per hour, there will be a loss of $1,000 a year on each plane.

AIR MAIL


118,006 lbs.
441,742 lbs.
774,387 lbs.
1,165,507 lbs.
1,512,197 lbs.
1,632,398 lbs.
852,823 lbs.
165,450 lbs.
810,855 lbs.
1,654,165 lbs.
4,063,173 lbs.
*7,700,000 lbs.
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
*Estimated
1918 – 1924 no extra postage required
From United States Department of Commerce, Aeronautics Branch

Air transport can make use of these planes for service in night trips or in shorter noon-day hops at a time they cannot be otherwise profitably employed and get the full value out of the investment before obsolescence overtakes it. Passenger transport planes which for any reason lose vogue or have impaired usefulness in passenger service can be transferred to express service where their remaining hours of value can be profitably used.

Saving Time

Air express, plus efficient pick-up and delivery, can save time on two types of trips:

1. Very obviously on long trips, extending greatly the radius of possible shipments between afternoon pick-up and morning delivery and showing material savings in time in transcontinental trips.

2. In making shipments within a radius of two hundred miles or more at the noon period, with pick-up at 10:30, plane trip 11:30 to 1:30, deliveries at 2:30, thus enabling a merchant to order in the forenoon from a large city market and get delivery in the afternoon.

Fruits and Fish

With perishables such as fruits and vegetables, air express not only can speed delivery, but by going into the upper atmosphere can keep the cargo cool without refrigeration. It seems possible that fruits gathered in Southern gardens in the early morning may be served for dinner in Northern cities and that fish and lobsters caught in the Atlantic Ocean in the morning may be served on Midwestern tables the same day.

Quicker Turnover

The tendency of modern retailing and wholesaling has been toward smaller stocks and quicker turnover. The airplane can be made an adjunct to hand-to-mouth buying and extra cost for express can be more than made up by profitable sales without investment.

The range of articles suited to airplane transportation includes all items whose value is considerable in proportion to weight or where speed is an important factor. Style goods of all kinds, women's apparel, draperies, jewelry, repair parts on machinery, advertising and display material, drawings

and plates, blue prints, samples in many lines of merchandise, flowers, gifts for all occasions and an unlimited number of items of various types and character offer potential markets for air express.

Rates for Air Express

Rates for air express can very properly consider volume, weight and size; possibly a schedule based on each—any of these schedules to be applied at the option of the transport company—may be an acceptable solution.

We believe a consequential volume can be had at a rate above that of rail express—just what the rate of maximum return will be found to be we cannot state. At ten times or at five times rail express rates we believe the opportunity for volume will be curtailed. We guess that at twice rail express rates a consequential volume can be developed and that at 50 per cent excess, rate will not be much of a deterrent factor where speed is desired or where pick-up and delivery service is more satisfactory.

The annual volume of express has been estimated to be about 15,000,000,000 pounds. If 5 per cent of this volume could be educated to prefer air express, it would create the equivalent of 1,000 pound loads for 2,500 planes for 300 days in the year. The development of air express will not be wholly at the expense of other express, for a considerable part of air express will represent new business, created by the more favorable opportunity for transportation and by the ideas created to send gifts and timely merchandise.

When volume to warrant it is in sight, specially designed planes will probably be used for air express. Meanwhile, other planes growing obsolete without full use will furnish inexpensive means for getting the service under way.

Pick-up and Delivery

The most difficult problem is pick-up and delivery. At first glance, it would appear that the best opportunity would be a tie-up with existing express or parcel post facilities, and much would be gained by a coöperation that would enable prompt train shipments when weather canceled a plane's schedule. But the development of air service requires in its pick-up and delivery that same type of enthusiasm and determination to attain accomplishment which the aviation industry has in its other departments, and the test of any pick-up and delivery system for air express is whether it will conserve the time gained in transit. If existing express services will render such a service, the tie-up will have advantages; otherwise a different arrangement will need to be made.

For the development of independent pick-up and delivery service for air express, several suggestions have been made; obviously the most effective is an owned and controlled exclusive air express service, and ultimately that will probably need to be evolved, but there may be some less expensive way during the development of the business. It has been suggested, for example, for mid-forenoon collection and mid-afternoon distribution, that contract with a bonded taxicab company or the delivery service of certain retail stores or of some other corporation with vehicles not in use at those hours might be made to advantage.

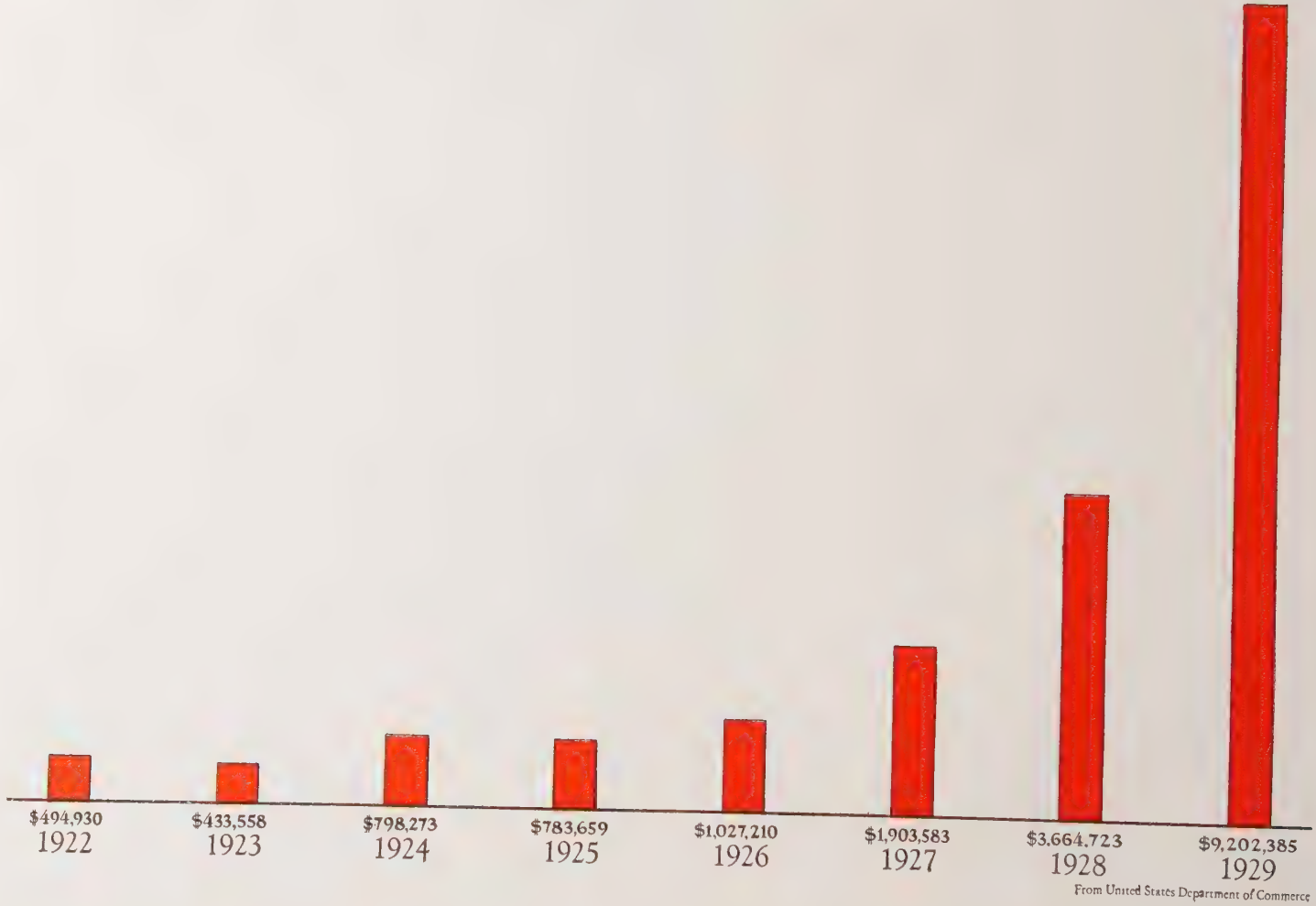
Just how air express will be developed and who will control it has not yet been indicated by Time's magic crystal. The opportunity is there and the rewards will go to the company which is most efficient in organization, in performance, and in selling.

Whom to Sell

Such efforts as were made to sell air express up to 1930 appear to have been directed primarily to traffic managers, but we believe sales efforts can more effectively be directed to the source of traffic demand, to the sales manager who wishes speedy delivery of rush orders, to advertising managers who wish their messages distributed hot from the press, to factory superintendents who brook no delay in getting a repair part. These men are in a position to see clearly that the profits which come from speed more than offset the increased cost.

EXPORTS

PLANES, ENGINES AND PARTS



From United States Department of Commerce

CHAPTER XIX

EXPORT

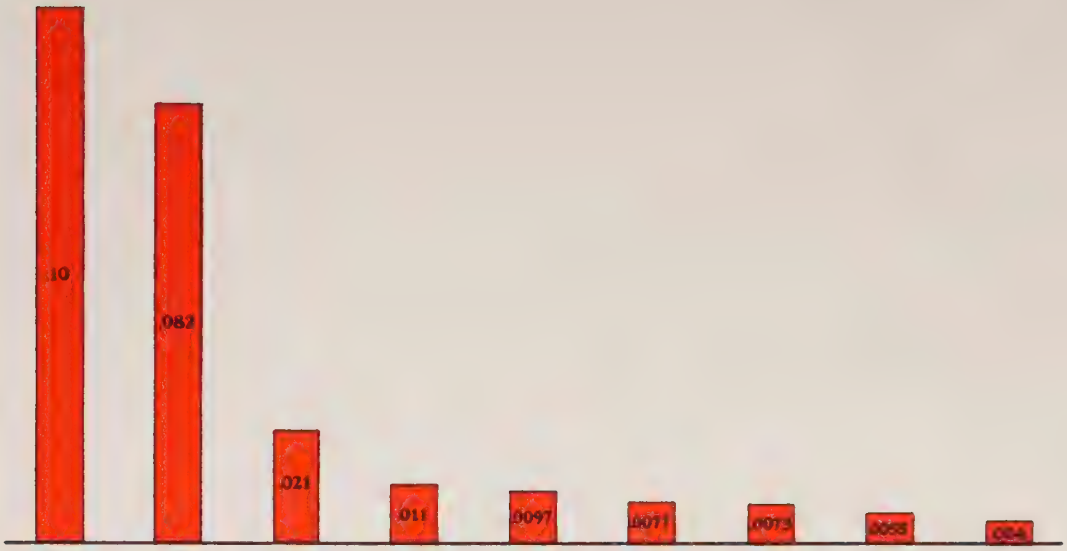
EXPORT trade offers a large opportunity to American manufacturers of airplanes. Many cities in Latin America are not easily reached by existing routes of travel. For example, to reach Bogota, capital of Colombia, from Barranquilla, the principal seaport of the state, requires a week or more by combined rail and river route but only a few hours by air. Cities along the west coast have good steamship connection direct with New York and San Francisco but infrequent service from one to the other. Throughout the Orient and practically all of Asia and of Africa and, in fact, of all the world except the United States and Western Europe, rail systems have been only partially developed. The United States and Europe west of Russia contain approximately 60 per cent of the railroads and approximately 25 per cent of the world's inhabitants. In all the rest of the world there is present an urgent need for the airplane to supplement existing transportation and it seems probable that with the establishment of air service over a great portion of these areas the construction of rail communication will be indefinitely postponed.

Countries in which railroads have been developed for internal communication but which are separated from their neighbors by water, such, for example, as the countries surrounding the Mediterranean Sea, have an opportunity to supplement their boat service by planes which by quicker time, more frequent schedules and greater comfort than is furnished by many of the small steamboats, can at reasonable rates win considerable patronage.

The subject of export trade in airplanes presents many of the same problems as American export trade in other lines—the problem of developing the trade through well-trained representatives who understand the people to whom they sell, who speak the language of the country in which they solicit business and who can differentiate properly between those preferences for style, decoration and mechanical design which are so deep-seated in national taste that they should be met, and others which can be overcome by a reasonable amount of sales efforts.

RAILWAY MILEAGE

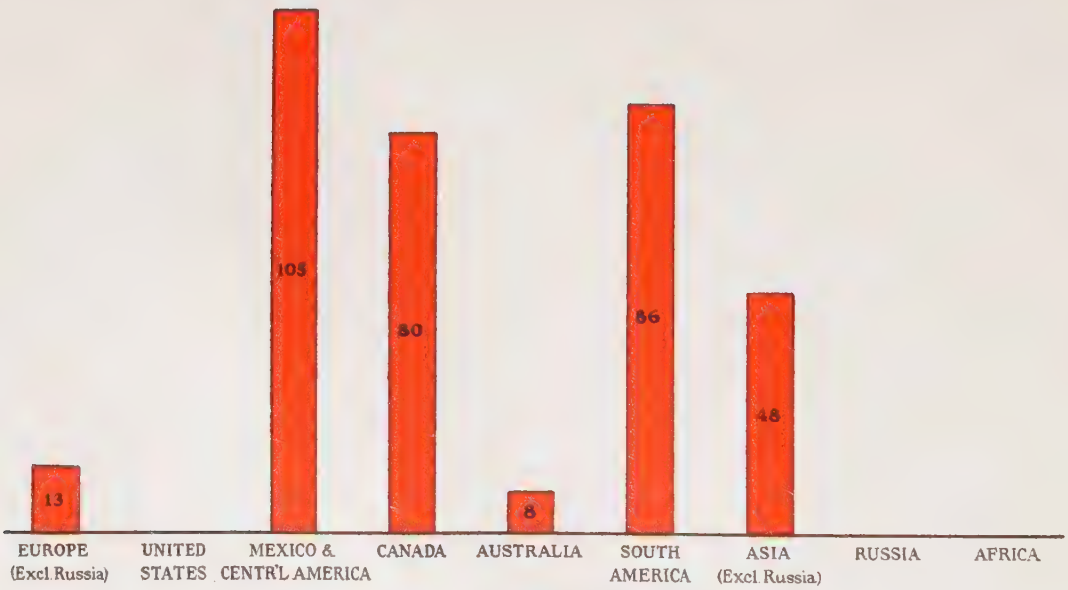
PER SQUARE MILE OF AREA



From Bureau of Railway Economics

EXPORTS OF AIRCRAFT

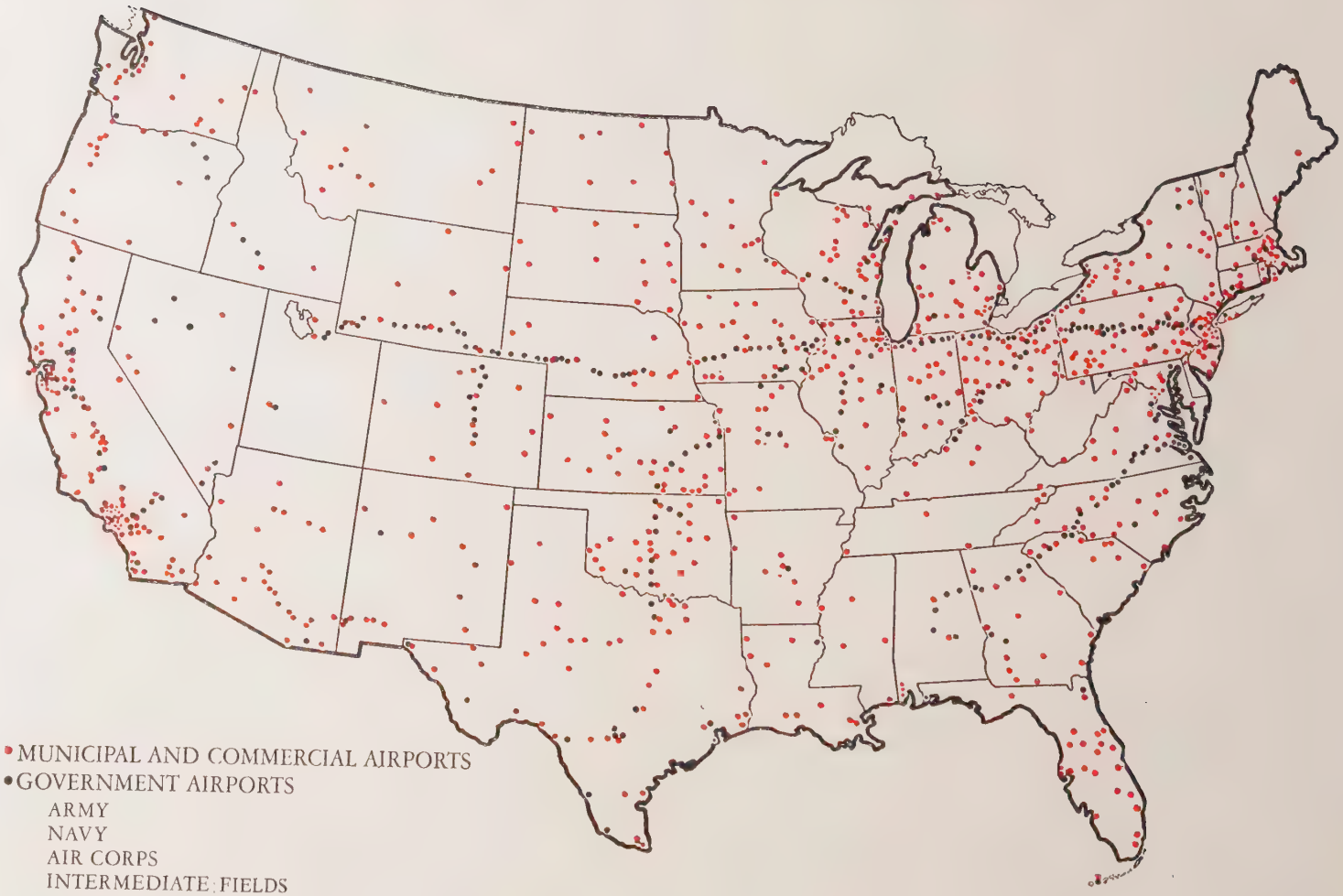
NUMBER OF PLANES – 1929



From Aircraft Year Book for 1930, Published by Aeronautical Chamber of Commerce of America, Inc.

The airplane routes recently established from the United States down both coasts of South America will prove, we believe, a valuable adjunct in developing sentiment favorable to American planes. With these routes, as with companies interested in export trade, the extent of their accomplishment for themselves and of service to American interests will depend largely upon the degree to which their employes have an understanding of, and a tactful consideration for, the viewpoints and sensibilities of the various nations involved.

AIRPORTS IN UNITED STATES



FROM DEPARTMENT OF COMMERCE, AERONAUTICS BRANCH

CHAPTER XX

AIRPORTS

ONE of the greatest needs of aviation is an extension and development of the airport system.

The development of airports is perhaps the greatest achievement in aviation in the United States during the past two years. The Aeronautics Branch announced January 4, 1930, that there were 1,552 airports in the United States, and stated that 1,413 others were proposed. The existing airports were classified as follows:

Municipal Airports	453
Commercial Fields	495
Department of Commerce Intermediate Fields	285
Army Fields	68
Naval Air Stations, including Marine Corps and Coast Guard Fields	14
Marked Auxiliary Fields	235
Miscellaneous Government Fields	2

Much Remains to be Done

It is not within the province of this report to mention individual airports or to discuss in detail the present condition of ground facilities. It is obvious to anyone who travels by air that much remains to be done—many fields need to be leveled and drained, most fields need better runways, hangar accommodations are inadequate, the passenger building in many cases is lacking, many airports are rendered hazardous by near-by high lines which should be removed, nearly all ports are confronted with a dust problem which demands some solution, very few have any landscape effects, some are poorly located.

Were one to scrutinize a single airport, it would be easy to become critical, but when one visits many airports, sees what has already been done and learns the plans for immediate improvements, the achievements of the past two years and the present active interest in airport improvements seem remarkable. Yet

in spite of this achievement, in view of the needs of aviation, it appears to us that only a good start has been made.

Suitable airports have been provided for the well-established transport lines. Many of these companies have also provided auxiliary or emergency landing fields. As rapidly as possible transport lines are providing adequate ground facilities.

Some cities and towns not located along established transport lanes have provided airports adequately equipped. For the most part, however, except for the larger metropolitan cities and for the cities served by regular air transportation, there are few cities and towns that up to the present have provided adequately equipped airports. Off the beaten track of important passenger transport routes, there are few airports which are suitable for a large airplane to visit; in fact, there are not many which are adequately equipped to care for planes of any size.

Equipment Lacking

One of the deficiencies is the lack of adequate lighting; a goodly proportion do not have any lighting facilities. Other deficiencies are poor runways—few airports are "all way" ports; poor drainage—some ports are hazardous in certain seasons; and a general lack of adequate service, together with a lack of reasonable policing for the protection of visiting airplanes from injury by curious sightseers.

Another factor that indicates a failure on the part of cities and individual owners of airports to discount the future development of aviation may be looked upon as a deficiency—namely, an acreage too small for future needs. Small planes may be able to use shorter landing and take-off lanes than they now require, but as express, freight and transport service develops a network of cross-country lines, few cities and towns of any size will be so isolated or remote that they cannot become a port of call for one or all of these services. The landing run required for large, heavy pay-load planes may be shortened as brakes are improved. The take-off, however, is likely to require more space as the size and load-carrying capacity of airplanes are increased.

Water Ports

Water ports where available seem likely to have an advantage over land ports in operating costs and maintenance. Landing and take-off area is available without cost. The water port is free from the investment in drainage, runways and oiling which is required for an adequately equipped land

port. Another factor that is frequently favorable to the water port is the advantage in time-saving from a "close-in" location of the port, enabling quick service to and from the central business district of a city. All cities with water facilities should be alert to the desirability of developing water ports, for with the development of air travel by amphibians, seaplanes and flying boats, a city without a seaport is likely to be handicapped.

Comparison With Automobiles

In the same way that poor roads in the early days of automobiling appeared to be the greatest impediment to the development of the automobile industry, so today the lack of airport facilities, second only to fog, appears to be the greatest difficulty in the way of safe and pleasurable flying. Just as the automobile, as it won popular favor, solved the problem of roads, so the airplane industry as it educates the public will solve the problem of airports. Every city will come to realize the value and, in fact, the necessity to itself of airplane contact with other cities, and that can be accomplished only through an adequate airport.

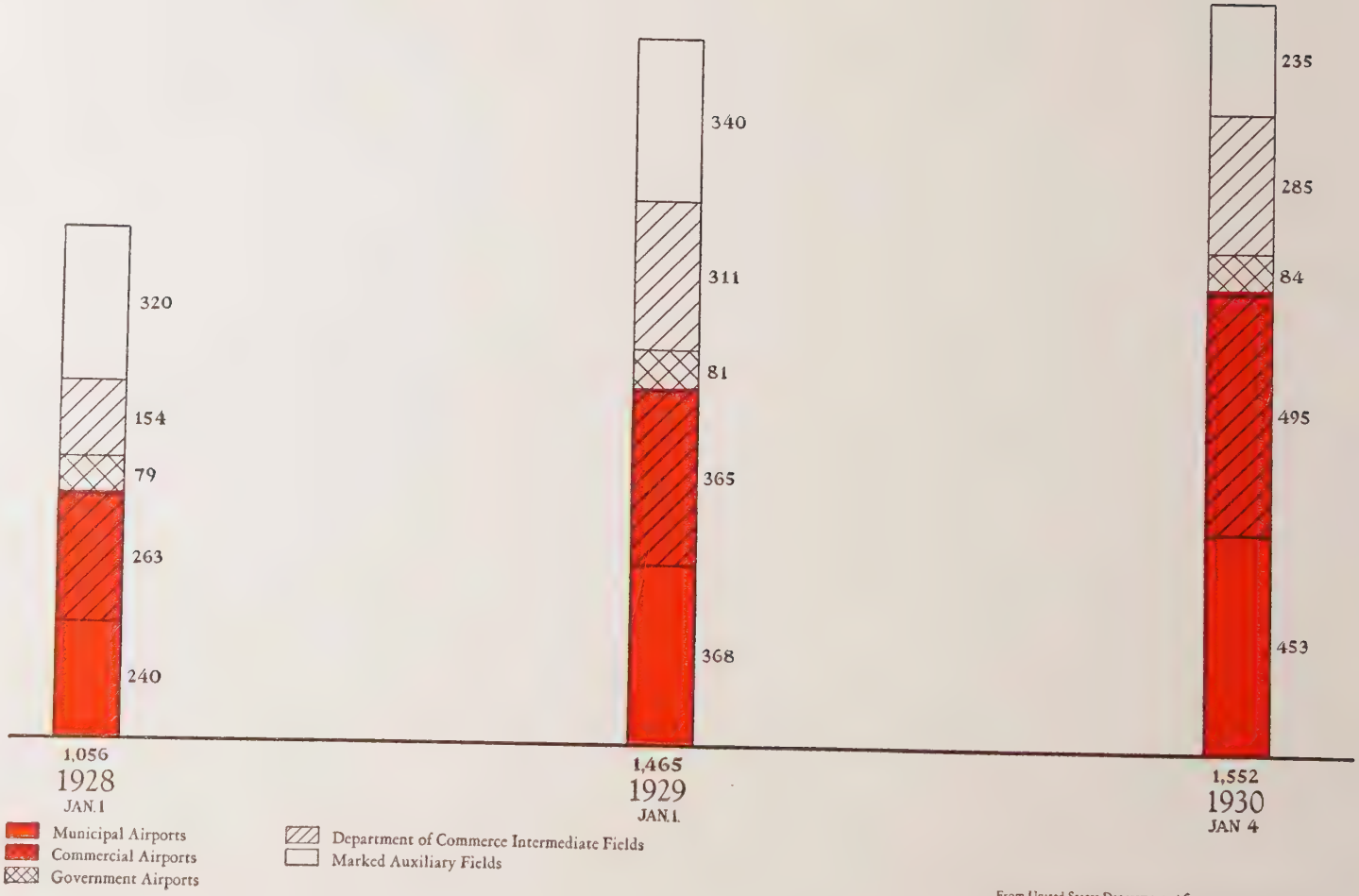
In time, in the same way that good roads made possible an automobile industry beyond the wildest dreams of fifteen years ago, so a network of adequate airports which will enable a flyer to cross the country in almost any direction, with suitable landing fields only a few miles apart, will make possible an airplane industry of consequential proportions. Speeding the development of airports is a major opportunity and responsibility of the aviation industry.

Public Versus Private Ownership

A fundamental problem arising in connection with the development of airports is that of public versus private ownership. From the standpoint of the community the need is for a well-located airport well equipped and efficiently managed, with the assurance that it will continue indefinitely to serve the needs of the community.

Among the best American airports are several which are privately owned. Private ownership can go ahead without political interference and has a better chance of getting necessary things done promptly and of getting the operation on a paying basis, all of which is to the advantage of the community. The greatest drawback to private ownership from a community's standpoint is the possibility that sometime in the future the private corporation may sell the airport for subdivision purposes.

AIRPORTS



From United States Department of Commerce, Aeronautics Branch

A successful airport will gather about it a community of services—hangars, service stations, sales offices, restaurants and homes for those who conduct the services, and hence drug stores, grocery stores, automobile garages and gas stations. All this activity will in turn attract other activity in that direction—perhaps a factory, perhaps a residential development. Sooner or later this airport is likely to have a good land value and the temptation to subdivide will be strong. Many a city lumber dealer who had made only a bare living on his lumber turnover has been able after a few years to make a substantial capital gain by selling the land on which his lumber yard stood. That occasioned no civic loss, for a lumber yard farther from the center of the city continued to serve the city satisfactorily. But the moving of an important airport away from the civic center may prove a serious matter, and a city which does not at this time make some provision for a municipal port, may at some later time find it necessary to pay a high price for some airport which has been privately developed or to accept a disadvantageous location.

The problem from a city standpoint is further complicated by the fact that the number of pieces of land suitable for an airport is limited and failure at this time to secure title to one of these may be regretted later. In many minor cities, the immediate prospects of return on the investment are insufficient to encourage a private corporation to make the improvements which the airport of the city should have, and here municipal investment becomes necessary. Some cities combine the advantages of municipal ownership with private management by paying for the land and improvements and leasing the property to a private concern for operation.

Enthusiasm for Airports

Enthusiasm for municipal investment in airports has been widespread. We are now at the point of having many municipally purchased and partially developed airports. From the standpoint of the aviation industry, it is desirable that the development of these airports proceed at a rapid pace, but hard-headed taxpayers inquire, "Just what practical advantages have we thus far reaped from our present large investment in an airport and how much more return will we get if we put in still more money?"

Again we are confronted with the problem of small volume and high prices. Perhaps no regular communication has been established with other cities—a taxi service exists but the rates perhaps seem prohibitive—there is a school, one or more sales offices, a few privately owned planes and a local hop service on Sundays and holidays.

The city has not got what it hoped for. What it has does not seem to justify the investment. What it desires and should have is air communication with the outside world by air passenger service, air express and air mail. This in turn cannot come about until there are airports adequate in number and in equipment to make cross-country flying safe and comfortable.

Again we are confronted with a vicious circle. Lack of airports retards development of aviation. Lack of volume in air traffic retards development of airports. There are in the United States about 1,500 airports and less than 8,000 licensed planes—in other words one airport for every five planes. Obviously more planes are needed to justify more airports—on the other hand, more airports are needed to encourage the purchase of planes.

To break this vicious circle, several things need to be done:

1. Advertising is needed to increase the use of existing aviation facilities and to educate the public to the necessity for airports and as to what an airport should be.

2. Vigorous work is needed on the part of each individual interested in aviation to get his own community to obtain and equip adequately a suitable airport.

3. The United States Government can help by establishing numerous emergency landing fields for trunk routes across mountain, desert, forest and swamp districts.

4. Cities and towns can help by the establishment of well-equipped airports, and where for any reason it is not practical at the present time to equip an airport, they can at least protect their future and perform an immediate service to aviation by the purchase and preparation of an emergency landing field, and—a matter of small cost but much importance—can make a real contribution to aviation by placing markers on prominent buildings pointing the way and giving the distance to the nearest airport or emergency field.

The importance of more and better airports cannot be stressed too strongly; for upon the creation and maintenance of numerous and well-equipped airports the aviation industry must depend for its future development.

CHAPTER XXI

KNOCKING COMPETITIVE PRODUCTS

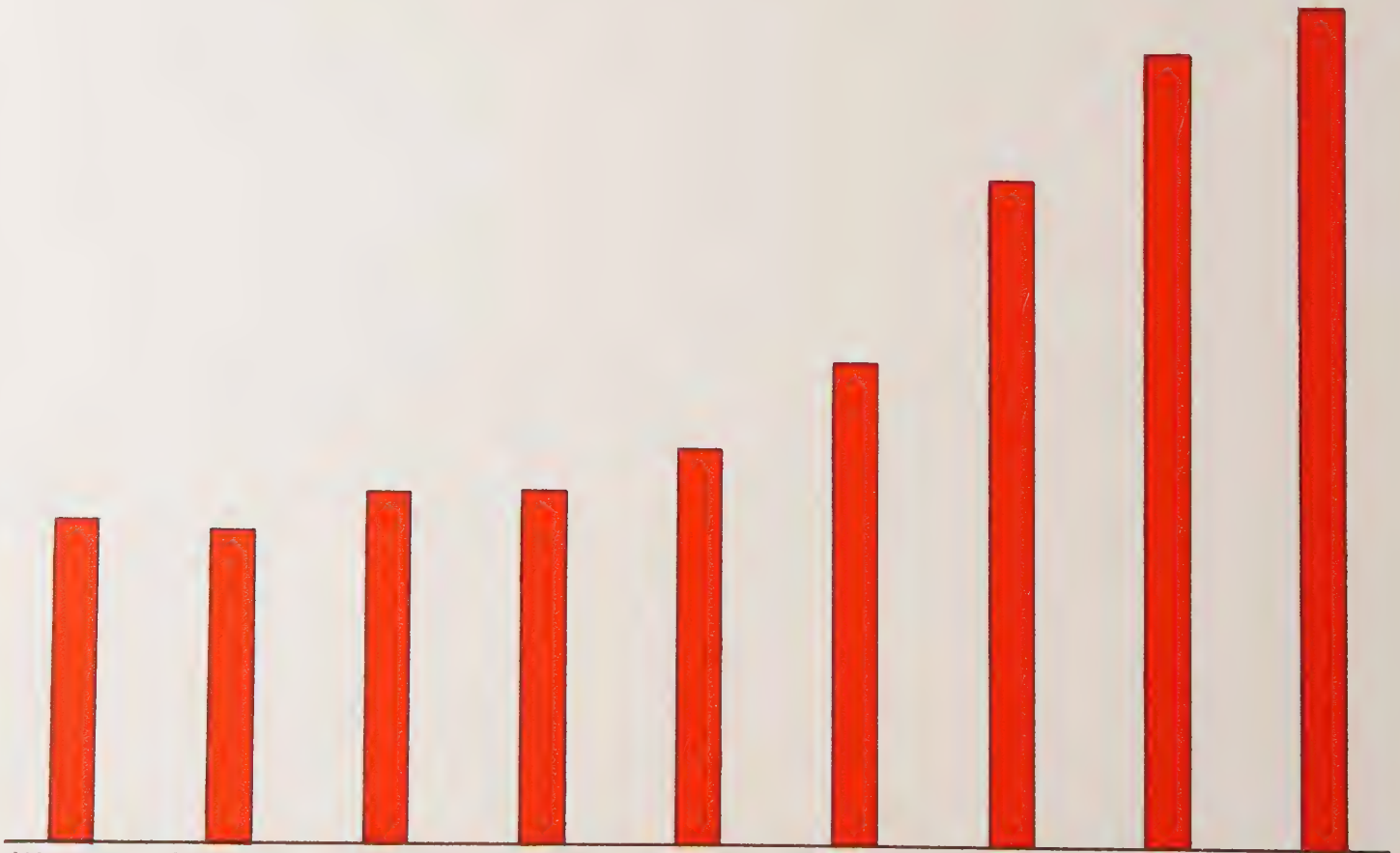
IN MARKED contrast to the good nature, enthusiasm and courtesy which characterize every phase of aviation, there was one discordant note which because it may have an important influence on the industry cannot be passed without comment—a tendency on the part of some whom we met, either directly or by implication, to knock competitive types of products. This is characteristic of a new and growing industry, but is unfortunate in any industry, for any industry needs good-natured coöperation on the part of all. It is especially unfortunate in the aviation industry, for the veiled intimations usually hinted lack of safety on the part of competitive designs—and one of the greatest needs of the aviation industry is for all to pull together in establishing public confidence.

In one stage of the automobile industry, the sixes knocked the fours and the fours knocked the sixes. The result was portrayed by a cartoonist who pictured Mr. Public with a salesman shouting in one ear, "Don't buy a Six" and another salesman shouting in the other ear, "Don't buy a Four," while Mr. Public tried to wrest himself away from both, saying, "I guess I'll buy a Five."

If a manufacturer of one type of construction suggests that a competitive type of construction is fraught with danger, while the competitor returns the compliment by intimating that he would not risk his life in his rival's plane, the prospect is likely to become frightened and buy none. Fear is a powerful motive in human conduct. When aroused it overpowers reason and leads to sweeping and indiscriminate decisions. The man who uses an appeal of fear against a competitive product is likely to arouse impulses that will destroy his own chances of closing a sale. If some of our observations are typical of the industry, it takes a brave man to buy a plane after he has listened for a week to the presentations of rival salesmen.

A firm resolve on the part of every sales representative in every phase of aviation to confine his solicitation to a promotion of his own product, to knock nothing and to allay rather than to arouse fear would do much for the industry and also for the sales productivity of those who so resolved.

AIRCRAFT APPROPRIATIONS, UNITED STATES



Fiscal Years Ending June 30

1931—Budget Estimates

Includes Army, Navy, Air Mail, N. A. C. A. and Aeronautics Branch, Department of Commerce

From Aircraft Year Book for 1930, Published by Aeronautical Chamber of Commerce of America, Inc.

CHAPTER XXII

ASSISTANCE RENDERED BY THE GOVERNMENT

NO REPORT on commercial aviation could be complete without acknowledgment of the deep indebtedness of the industry to the United States Government for its great service to aviation.

During the decade following the war it was Government encouragement in the form of contracts by Army, Navy and Coast Guard services and the assistance of its engineering bureau that kept the industry alive and produced the marked mechanical development in planes, engines and other equipment.

The Postoffice Department by mail contracts made possible the establishment of transport lines. The Department of Commerce by licensing manufacturers and pilots, by inspection of planes, by preparing air route maps and by the establishment of traffic regulations has done much to make possible a safe and orderly development of the service. The Weather Bureau has been performing an indispensable service for aviation. The National Advisory Committee appointed by the President through the Government Research Laboratory has made valuable engineering contributions, such as the N. A. C. A. cowling, which are available for the use of all manufacturers. It has also trained a large part of the personnel at present employed in commercial aviation.

While the Government in encouraging aviation may properly have been motivated primarily by considerations for public defense, yet the Government has been sincerely interested in commercial aviation and has performed a distinguished service for commercial aviation which deserves the support and commendation of the American public.

Extension of Services

All these services should be maintained and there are extensions of these services which the Government can properly perform and which deserve support and backing to make the expenditures possible.

1. An extension of weather-bureau services so that there will be available at strategically located stations in all sections of the country, reliable information as to flying conditions within the radius of a single flight from that station, and at all hours of the day and night someone to answer telephone requests for the information.

2. A development of radio communication from and to all these strategic stations so that planes, public and private, can get timely warning of unexpected storms and if caught in fog can be guided to the ground.

3. A development of danger beacons and lighting of trunk routes crossing the country in all directions.

4. The establishment of additional emergency fields and route signs in desert, mountain, forest and swamp districts.

5. And above all the continuation of its attitude of helpfulness in originating and executing services not foreseen at the moment but which can add to the safety and efficiency of airplane operations.

Local Governments

Local governments have also done much. They have in many cases spent large sums for airports and equipment, and great credit is due the various municipalities for their helpful service.

Much remains to be done. Some municipalities need to acquire airports. In most cities there is an urgent need for the improvement of the airport, and, what is scarcely less important, improvement in rapid transportation between airport and business center—establishing a well-paved automobile highway protected at cross streets by stop signs, or doing whatever in the individual case will insure rapid and comfortable transportation to the airport.

Marking Cities

Another service, trifling in cost to each community, is of major importance to the private plane owner. All cities and towns, no matter how small or isolated in location, can perform a real service for aviation at negligible cost by marking the roof of the largest building, preferably one near a railroad, with the name of the town and an arrow marking the direction of magnetic north. The letters in the marking should be sufficiently large and of sufficient color brightness and contrast to be legible from an airplane a thousand feet or more above the city. In addition a city or town with an airport should add the word airport under the name of the city in the air sign, together with an arrow

pointing in the direction of the port and the distance in miles indicated between the air sign and the port.

Some railroad systems have air marked, with the name of the city, passenger or freight stations on their lines. Some oil companies have placed the name of the city on gas tanks or other buildings. A few states have marked the name of the highway together with a direction arrow on well-known trunk lines. One needs only to travel cross country in any section of the United States to realize how much remains to be done and how essential it is for every city and town to be adequately air marked. If the residents of a city knew how lost their town looks without a name to one who is taking an airplane trip across their state, this much-needed improvement would be quickly and effectively made.

CHAPTER XXIII

LOCALIZATION OF MANUFACTURE

MANUFACTURE in many industries has tended to center largely in and near a single city, sometimes has re-created that city into something quite different from what it was. The automobile industry, for example, did this for Detroit, the tire industry for Akron and the motion-picture industry for Hollywood.

Will the airplane industry build an airplane city? It is too early to attempt to answer that question, but one may list the influences which have determined the localization of manufacture. Among the important factors are:

Favorable climatic conditions.

Sufficient supply of labor suitably trained for the industry.

Encouragement by local financial institutions.

Proximity to raw materials and to such parts and accessories as need be purchased.

Advantageous location with reference to markets.

Satisfactory shipping facilities.

The chance location in a formative period of one or more men with sales vision and manufacturing ability.

Hollywood, Akron and Detroit

These factors have varied in relative importance in the different industries. Climate and scenic advantages were the largest factors in concentrating the moving-picture industry in a suburb of Los Angeles.

Tires and automobiles found in the Central West proximity to markets and raw materials, with enough labor already skilled in metal and wood working to get the industry started and with abundant unskilled labor which could be attracted by a good wage scale from the farm and from Eastern urban centers.

But why Akron and why Detroit? Akron apparently chiefly by the chance location of firms with vision and ability to keep pace in manufacture, sales, and advertising with a rapidly growing industry. Detroit partly by the chance of

the personal element, partly by better support of local banks when financial assistance was not easy to obtain; largely because Detroit firms early became effective national advertisers. They outsold competitors of other cities and since they gave more attention to advertising they came more clearly to understand consumer wants and to be more successful in styling their products.

Localization of Airplane Manufacture

Financial control of the aviation industry has already centered in New York. This came about through mergers and through offering various aviation stocks and securities to the public. It seems to us, however, that a majority of the manufacturing plants for airplanes are more likely to be outside of Greater New York.

From the standpoint of climate, Southern California and the Central and Southern states beyond the Mississippi River appear to have advantages. Every plane must be test flown, and planes take up so much room that it is important to have the test flights and delivery made as soon as practicable after assembling is completed. In Kansas, Oklahoma, Texas, Southern California and some other portions of the Central and far Western areas, planes may be safely test flown almost any day of the year. Furthermore, much of this country is very flat, which adds an element of safety to the test flights and to student work.

Distance from center of markets is less a deterrent factor with airplanes than with most products, for an airplane can be delivered from the center of the United States to almost any point in the United States in about twenty-four hours.

The labor factor, on the other hand, is favorable to those cities of the Central and Eastern States where skilled metal and wood workers abound. An airplane requires exactness in manufacture, and the type of labor best adapted to the needs of the industry prefers to live in larger cities and offers resistance to being transplanted to small or distant communities.

At present airplanes are largely handmade; in some instances the factory processes are more suggestive of fine cabinet making than of automobile construction. We cannot believe that these cabinetlike jobs represent the ultimate in airplane design. They may find a niche as specialties, but the great mass of planes ultimately, we think, will be produced largely by automatic machinery. As that stage is approached, cities equipped for mass production of automobiles and automobile parts will have their opportunity to win leadership in the industry.

For flying boats and amphibians, the Eastern seaboard has a present lead and apparently some permanent advantages. The East offers a favorable market for these types of planes, and manufacturing facilities and harbor conditions in several cities along the East Coast are favorable. On the other hand several of the manufacturing centers of the Central West have lake port facilities for manufacturing and testing seaplanes.

The Final Factor

Handicaps may be overcome. Metal and wood working factories can be built anywhere the need exists, and labor can be attracted to new homes by better wages and better living conditions. In the last analysis, whatever can be sold can be produced. The final factor, then, is sales, and the aviation industry, as the automobile industry, is likely in the end to center where firms capable in design and in manufacture excel in sales and advertising.

CHAPTER XXIV

USED PLANES

IN OUR 1914 Automobile Report, we stated: "Of all the problems that vex the automobile industry, probably the most serious and the most difficult of solution is that of the used car," and, "The second-hand-car problem is likely to become more acute as the number of cars in use increases." The prediction proved to be only too true. It seems to us probable that with the growth of the market for individually owned planes, the second-hand plane will become a major problem in the industry—in one respect more serious than in the automobile industry, for there will be a question mark as to its safety and a suspicion that indication of lack of safety caused its original owner to exchange it. This will be partially offset by Government inspection before licensing. On the other hand, suspicions as to safety of second-hand planes are likely to be strengthened by mishaps in which the news reports may chance to mention that the plane was recently purchased at second-hand.

Even if the prospective purchaser is satisfied as to the soundness of the plane, he may fear that before he can get a satisfactory return from his investment, some Government inspector may pronounce his purchase not airworthy. On the other hand, the problem will be rendered somewhat less acute by the final scrapping of planes before they reach the stage of collapse at which automobiles ordinarily go to the junk pile.

Dealer at a Disadvantage

In trading new planes for old, the dealer is at a disadvantage, for, as stated in the Automobile Report of 1914, "The person who buys an automobile is a successful business man or he could not afford to buy a car. He is, therefore, often a better salesman than the dealer. Thus it often happens that the car owner gets the best of the bargain. He is aided in this by the fact that he is not obliged to make the trade. He may use his car another season, while the dealer must dispose of his cars before the manufacturer makes his midsummer announcement of new models."

This is likely to prove equally true in the aviation industry. The prospective purchaser of a plane has probably already had experience in driving a bargain in exchanging an old automobile for a new one and is likely to get the best of an airplane salesman if the sale is conducted on the basis of price.

Only One Solution for Automobiles

As to a solution for the problem, we quote from a booklet issued in 1915, based on our Automobile Report of 1914: "When one inquires about the difficulties in automobile retailing, one dealer says that in his community prices are cut; another states that too much free service is given; a third complains that too much is allowed for second-hand cars; a fourth asserts that it is the custom to throw in extra tires or other accessories.

"These are all phases of simply one trouble, for which there is but one solution. The one trouble is price cutting, direct or indirect. The one solution is to have a sufficient consumer demand for a particular car, so that the consumer will pay the full price for that car in preference to buying a competing car at a cut price."

Only One Solution for Airplanes

In sixteen years of wrestling with the problem, the automobile industry has thus far found no other solution. It seems safe to say in turn for the aviation industry that trading in second-hand planes will inevitably lead those in a weaker position with reference to sales of new planes to offer more for old planes than can be obtained on resale. This, like all other forms of price cutting, will be a disorganizing force in retail selling. The only solution for an individual manufacturer of planes is to build so much confidence in his product by sound manufacture and by advertising that prospective purchasers will pay the full price for his product rather than buy a competitor's product at a bargain offer.

CHAPTER XXV

INSURANCE

INSURANCE companies are studying the problems created by aviation. Some progress toward a solution has been made. Accident insurance companies, for the most part, will issue without additional cost indorsement to existing policies, extending the insurance to cover the insured in the event of accident occurring while the insured is riding as a fare-paying passenger on any recognized airline traveling on regular schedule to designated points. They do not, however, consider the airplane as a common carrier, and if a double benefit clause is included in the policy for accident on common carrier, it does not apply to an airplane accident.

With the exception of this one type of insurance, however, the rates quoted to individuals by accident and life insurance companies are a deterrent influence to personal flying, and the sales arguments used by insurance sales representatives to justify these rates are likely to frighten a prospect into staying on the ground.

Accident Policies

To buy a one-day accident policy for an airplane trip over a transport line for which the traveler is accustomed to pay twenty-five cents for a day's rail trip, a prospective air rider is asked $5.00 or twenty times as much. For a combined air and rail trip, the rate is $2.00 per day or eight times as much as for rail alone. A suggestion to a prospective rider that he buy a policy at either of these rates gives him not so good a start for a restful day. Some transport companies, we understand, have negotiated accident policies for all the passengers at wholesale rates, charging $2.00 on each ticket for the coverage. Even that is eight times the rate for a one-day rail trip and sounds not overly reassuring.

Rates for accident coverage to ride as a passenger in a privately operated plane are even less reassuring. On a policy costing $5.00 per thousand, to get an indorsement allowing riding even once as a passenger in a privately owned plane, a rate was quoted of $17.50 per thousand *extra*. In other words, for

$5.00 one can secure coverage to ride any day in the year in a regular transport plane, may drive an automobile for a Sunday excursion every week-end, may scale mountains and visit mines, may walk through the woods in deer-hunting season and may do circus stunts in a gymnasium, but if he wishes to ride in a privately operated plane, even if the plane is the same make as those used on transport lines, with mechanic and pilot equal in experience to the best of transport plane personnel, an excess of more than three times the cost of all other possible accidents combined is charged. This is not encouraging to aviation.

Life Insurance

Life-insurance policies, except those of recent date, for the most part contain clauses making them incontestable for any reason except false statements after one year or in some cases two years. Hence, most life-insurance policies issued prior to 1928, today cover airplane hazards. In applying for a new policy, we understand it to be common practice to inquire in the application blank whether the applicant plans to take airplane trips, and if an affirmative answer is given, to charge an additional premium if the trips contemplated exceed a certain number.

The following schedule of extra premiums on a straight life policy of $1,000 will illustrate:

Number of Flights Per Year	Annual Extra Premium per $1,000
1 to 6 inclusive	None
7 to 10 "	$2.50
11 to 15 "	5.00
16 to 20 "	7.50
21 to 25 "	10.00

Additional premiums for persons traveling as passengers in privately owned planes are reported to vary from $2.50 to $25 per $1,000 on standard life policies.

Additional premiums for a person to pilot his own plane are reported to be $12.50 to $25 per $1,000 of straight life. All this is none too encouraging to one who is beginning to think of taking to the air.

Liability Insurance

To a company owning a plane a wide range of insurance coverage is offered. The following table indicates some of the possibilities and approximate rates.

Liability to Public (Excluding Passengers)

	Approximate Annual Premium
Limits—$ 5/10,000	$95.00
Limits— 10/20,000	110.00

Liability to Passengers

	Approximate Annual Premium
Limits—$ 5/10,000 (for aircraft carrying two passengers in addition to pilot)	$291.00
Limits— 10/20,000	582.00
Limits— 10/50,000 (for aircraft carrying four passengers in addition to pilot)	1320.00

Damage to Property of Owners

	Approximate Annual Premium
Limits—$1,000	$70.00
Limits— 5,000	90.00

Insurance on Aircraft

1—(On ground only—annual premium about 2½%) contingent upon fire-contents rate.
Fire on ground and air—annual premium about 5% (rate of hangars affects cover).

2—Accidental damage with deductible of from 5% to 10%—annual premium 9% to 17½% of value.

3—Windstorm and tornado with deductible of 5%—annual premium 1½% to 2% of value.

4—Theft with $25.00 deductible—annual premium ¼% to 1% of value.

Property insurance against damage by an airship is also offered on forms which are similar to standard fire policy forms to cover building and contents at rates reported to vary from 8 cents to 12 cents per year per $100 of value, according to the distance from a regular airport, with a minimum charge of $5.00. A three-year contract can be written at two and one-half times the annual contract price.

For a company privately operating a plane, to insure the life of its employes against accident while riding as passengers in the plane, a five-month rate was quoted somewhat in excess of 1 per cent of maximum liability.

An Opportunity for Service and for Profit

We have not enough knowledge of insurance to judge the equity of the rates. We are informed that insurance companies are showing an attitude of helpfulness and that the trend of rates is downward.

We hope that flying is not so hazardous as some of the present rates indicate. We are confident that the present insurance situation discourages flying. We are also confident that aviation is going to be a large industry and that insurance companies are presented with a new and large opportunity for service.

It is possible that some life insurance company by leading in a more liberal attitude toward flying on the part of business executives will build desirable business without excessive losses. It is also possible that some accident company which approaches the problem from the angle of trying to classify more closely the risks of those who wish to fly occasionally and to offer to each class as low a rate as seems possible, might find a profitable opportunity. We believe the whole problem of insurance deserves careful study on the part both of the aviation industry and of the insurance industry, to see whether some basis of sound insurance operation can be worked out which will be less injurious to aviation markets.

CHAPTER XXVI

PHOTOGRAPHY, DUSTING AND OTHER AIR SERVICES

A CONSIDERABLE number of commercial uses other than transportation are being developed for airplanes. Of these, one of the promising uses is photography.

The process consists essentially of flying an area in as straight a line as possible while the cameraman snaps an exposure at the rate of about one to every eight seconds. It is necessary for a man to maintain the camera in a perpendicular position and hence, it is said, the action may as well be done by a man as to install an automatic apparatus.

The films come on large spools like the films for a small camera except that they are on a large scale. At a thousand feet with a twelve-inch lens, two hundred and fifty pictures are needed for a square mile. At ten thousand feet, two and a half pictures cover a square mile. Pictures are taken with a 50 per cent overlap.

These pictures are developed and then all the pictures for a given area are reduced to the same scale. These are pasted together and a new picture is made. From these in turn, by a special printing process, many prints may be furnished. The cost of the master picture is relatively high, but where sales can be made of a considerable number, the cost becomes moderate.

These surveys have proved valuable for a variety of uses—tax valuing of real estate, selecting right of way for high-power lines, flood control, market analyses of cities, and photographing sections of timber.

Dusting

Dusting of crops is another use. This has proved successful in combating the boll weevil. A single company in Texas in 1929, using six planes, is reported to have given four dustings to almost 100,000 acres at a cost, including materials and ground labor, of about $3.00 per acre. Since in dusting

cotton it is the practice to fly low, the use of airplanes at present is pretty much restricted to areas where the ground is fairly level and fields are free from obstruction. Improved apparatus may make satisfactory dusting from greater altitude practicable. It is possible that dusting can be extended profitably to fruit and forest trees, to wheat, corn and other field crops which may be attacked by pests.

Other Uses

There are a number of other uses, such as cruising for timber, advertising, fighting forest fires and locating schools of fish.

Little is known by the public about commercial uses for airplanes other than transportation uses. As services are sufficiently perfected to warrant, the public can be informed and markets won through advertising.

CHAPTER XXVII

WOMEN AND AVIATION

SOME women will learn to fly for the thrill, some for publicity, and as the private ownership of planes becomes more common, there will be an increase in the number of women who learn to pilot the family plane. But we believe the number of women who will be attracted to professional flying will be too limited to justify cultivation as a special market.

On the other hand, as patrons for air transport lines, we believe women do furnish an excellent potential. Women appear to have no more fear about flying than men. Many mothers of small children object to going in an airplane, but this appears to reflect a sense of duty rather than personal timidity. Women know little about the mechanics of flying and are not worried about the details. If they trust the company and its pilots, they go without hesitation and appear to have more ease of mind and appear to get rather more enjoyment out of flying than do men.

We realize the possible inaccuracy in such a generalization, for some of both sexes are eager to take air trips and some of both sexes are timid about getting off the ground. But whether the above generalization be literally correct, at least it is true that there are enough potential women patrons of air transport lines to make it well worth while to give careful attention to the market.

What Needs to Be Done

To make air trips attractive to women several things need to be done. The passenger terminal should have a bit of landscaping. Waiting rooms should be attractive and restaurant service should be neat. There should be a covered passageway from waiting room to plane to protect from wind and dust. Planes should be comfortable and pleasant with unobjectionable toilet facilities. Service throughout the system should be courteous. With these things accomplished, advertising copy may well devote part of its appeal to women, painting the thrill and joy of flying and the refinement and comfort of planes, equipment and service.

Fear for Relatives

While women appear to have little fear about flying themselves, they do have an instinctive dread about letting husbands and sons take any chance, and women are in many instances a strong deterrent factor to the use of airplanes on the part of their male relatives. This may in part be economic—the realization of their dependence upon the earning power of the producers. We think it is more the maternal instinct, ever ready to disregard personal danger but jealous to protect those who are loved. The education of women to look upon air travel as normal rather than as an extraordinary adventure would do much to lessen the apparent resistance of men to air travel.

Style Element

With reference to planes purchased for private use, it may be said that as soon as planes come to be used for the family trip, the wife will need to be considered in making the sale and if, as it seems to us likely, eventually airplanes reach a point where correctness of manufacture can be assumed and there be little to choose in mechanical performance between leaders in popular classes of planes, that which happened when the automobile industry reached this stage will assert itself again in the aviation industry. Appearance, lines, color, upholstery, decoration will become potent sales influences and women will become an important factor in the selection and in many cases will render the final decision.

CHAPTER XXVIII

FARMERS AND AVIATION

IN THE early days of automobiles, farmers offered vigorous opposition. In 1914 we stated in our Automobile Report: "The farming sections present the largest virgin market for automobiles; for the farmers have both the need and the ability to buy," and quoted with approval a dealer who said: "10 per cent of the farmers who own farms own automobiles, the other 90 per cent are looking at them."

Today a majority of the automobiles are in communities of less than 10,000 population, including rural districts. If mechanical developments make it possible to take a plane up and down safely from a one-acre or even from a four-acre lot, and price gets to a level comparable with automobiles, it seems to us likely that the farm market will offer a major opportunity for the sale of individual planes.

Room and Need for Plane

The farmer has room for a private landing field and hangar and he is mechanically inclined. The automobile has broken his isolation and given him contact with near-by communities. Many, however, find themselves too far from a city of consequential size to do more than pay an occasional visit.

An airplane would enable quick contact with a distant city in case of accident to a person or breakdown of machinery. It would furnish quick transportation to town for business purposes or for shopping and the theater. It would furnish a unique opportunity frequently and quickly to compare the condition of crops with others in the section, to get an accurate picture of the condition in the center of fields, and on ranches to locate cattle and detect dangers to herds and flocks.

Students for Aviation Schools

At the present time a considerable part of the students in aviation schools comes from the farm. The farm lad lives out-of-doors, seeing throughout his day-long work the broad expanse of the sky, and when a passing plane

invites him to lift up his eyes, he catches a vision of the joy of flying, of getting above the plodding toil in the field and of enjoying the freedom of the birds in the unlimited expanse of the heavens. His life on the farm has equipped him with good physique and steady nerves and has made him acquainted with many kinds of machinery. He is well equipped for the task to which his vision impels him. But father and mother have plodded the furrows of life too long to be thrilled by the vision; they need to be sold on the opportunities in the industry to which their son feels the call for his life work.

Effect of Automobile and Airplane

The automobile which lengthened the radius of the farmer's business and social contacts from ten miles to forty miles, produced a marvelous economic and social readjustment. Crossroad stores, district schools and village churches gave way to better stores and consolidated schools and more efficient churches. The farmer has broken free from his isolation. Market distinction between farm trade and city trade has disappeared.

What further revolution in American rural life will be wrought by the airplane as it extends the radius of social and business contacts from forty to two hundred miles? To attempt to complete the picture of what may happen is too much for the imagination, but some things are clear—farmers too removed from cities to have been freed from isolation by the automobile will be brought into close contact with neighbors and with urban life. To have lunch with a friend a hundred miles away or to attend a church 200 miles distant will be easy enough to become customary.

A hop of 500 miles to a major city for an afternoon's shopping and an evening at the theater and back the next forenoon will be an everyday opportunity. Hops of 1,000 miles or more in a week-end to spend a few days with a friend or in a great city or at a pleasure resort and back the next week-end may all become a part of the farmer's life. In fact, the farmer with his airplane may perchance become our most cosmopolitan citizen. This will be quite a change from the "hick" of a generation ago, but the "hick" was the product of isolation. What will another generation do for tillers of the soil who have at their command communication with every important city of our land?

The automobile took people from cities into the suburbs. Will the airplane in the next generation cause another hegira outward? Will the large estate and the glorified farm become popular—in other words, will the airplane lead native Americans in considerable numbers back again to the land? If so, it will mean much for the airplane industry and much in American thought and life.

CHAPTER XXIX

PUBLICITY

THE airplane industry has received an unusual amount of publicity. Much of the publicity has been good for the industry—the acclaim of successful fliers, accounts of aviation meets, stories of new development in airplane construction, stories of the air mail and of transcontinental flights have fired the imagination of the public as no other industry has ever done, but with it all has been an appeal to the recognition of heroism, leaving a conscious or subconscious feeling on the part of average citizens that for them to attempt flight would be heroic—something possibly to be done once as a stunt to prove their bravery but not to be tried often.

Much of the publicity has been bad. Airplane disasters have news value. From the days of Greek mythology, each generation has been stirred by the tale of Icarus, son of the first maker of wings for human flight, who in the joy of youth flew so near the sun that the wax on his wings melted and he plunged to an untimely death in the sea. To challenge the sky, to be hurled down to earth in disaster, has ever appealed to the human imagination and hence airplane mishaps from every corner in the land are gathered together on the front page of metropolitan and local papers.

Thus, it has come about that while all have had their imaginations stimulated by the achievements and the mishaps of aviation, few indeed have any picture of the everyday operation of passenger air transport—of planes arriving and departing on schedule, of passengers reading their papers, viewing the scenery, eating lunch and taking naps. Advertising is needed to convey the idea that air transportation is a normal everyday way to travel and that those who travel by air are not to be looked upon either as heroes or as fools, but sensible folk who travel in the most comfortable and most expeditious manner.

Races and Stunts

In initial stages of any industry, it is important to show what a product is like and what it will do. In this stage, shows, races and performance stunts

are of service, but as an industry develops, these lose much of their sales value. In the early days of the automobile industry great automobile races attracted crowds who marveled that a machine could beat a horse, and they left discussing whether they ought to buy a car and what make was best. Soon the accomplishment of the automobile became commonplace; manufacturers' advertising took the place of speedways in educating the public. Races continued to draw good gate receipts but the public was amused only as specially built cars driven by professionals raced around the curves at dare-devil speed.

We are inclined to think that the aviation industry has reached a point where from the standpoint of sales value to the industry, races and stunts will render diminishing returns. People know what airplanes are like, they know that they can cross the continent in hours instead of in days, they know that the ocean has been crossed by a plane, they know that a lighter-than-air craft has circled the globe, they have pretty well exhausted their thrill out of watching dare-devil feats at the airport or on the movie screen; they will still pay admission fees to see more dare-devil feats, but these do about as much good to aviation as the crash of railroad engines at the fair grounds did for rail passenger traffic.

Effect of Races and Stunts

People who go to air circuses will get a thrill out of the daring exploits, but subconsciously will register fear and conclude the only really safe plan for themselves personally is to stay on the ground. Displays of airplanes on the ground or in the air have their value. Demonstrations of greater safety, of ease of handling, of anything which will register pleasant sensations of grace, of beauty, and of utility are to the good. The thriller helps with the gate receipts, but does not promote air-mindedness. If successful, it registers with many the danger of the air; if it crashes, it sets back the whole industry.

An Investment of Half a Billion Dollars

Publicity needs to be supplemented by paid advertising. Publicity seeks news, and much of the news is unfavorable to aviation. A reiteration of the less sensational but more valuable facts about aviation can be brought effectively to the attention of the public only by paid advertisements.

The industry is estimated to have invested half a billion dollars or more to get ready to offer a service. An investment of a few million dollars in paid advertising to make a market for this half-billion dollar investment appears to us sound judgment.

CHAPTER XXX

ADVERTISING OPPORTUNITIES

THERE are numerous advertising needs in the aviation industry. Some of these have already been mentioned and all that is attempted in this chapter is to summarize some of the more important opportunities.

A Brand Name

There is the opportunity to build a reputation for a brand name, a name which as it passes season after season from one model to another—perhaps from one type of construction to another—will each year win additional recognition of merit. Such a brand acquires a value over and above the merchandise on which it is placed. In 1903 the Cadillac car was advertised in The Saturday Evening Post for $750. Today such a car could be sold for little, but the name Cadillac for use on automobiles is worth millions.

The opportunity to build a name in the aviation field is today open to one who builds a superior product. Today brand names in aviation are for the most part unknown. The public has been impressed with the Ford advertising—they believe in three motors and in metal bodies and in the name of Ford.

On the street, a man is likely to say of a passing automobile, there is a Packard, a Chrysler, a Buick, a Nash, a Ford—as he looks into the heavens he says, there is a plane. On the ground he recognizes that some planes are large and some are small. Some have open cockpits and some have cabins, some have one motor, some have two and some have three. He may say, there is a trimotored Ford, but it is quite a sophisticated American citizen who goes any further in identifying planes by brand name. It will mean much to a manufacturer to have his brand name mean something distinctive.

Parts and Accessories

A parts manufacturer has an excellent opportunity to identify his name with merit and obtain a consumer preference which will cause his product to

be made standard equipment on planes. Plane manufacturers wish to sell planes—they do not wish the sales energy of their distributors and dealers diverted from their plane to the selling of separate parts. Wherever a part or accessory with merit receives public recognition, it will be to their advantage to use this part and avoid all sales argument on the subject. The advertised part will pass on some of its prestige to the plane. At any rate, it will carry consumer acceptance and obviate any necessity for sales effort on that particular part. A salesman who has to sell half a dozen parts to a prospect as being as good or better than those the consumer wants seldom retains enough sales attention on the part of his prospect to get a chance to sell his plane.

One of the greatest advertising opportunities in aviation is for an engine manufacturer to win consumer confidence in his product, for, as discussed elsewhere, it is the engine which keeps the plane up and consumers are keenly interested in engines. In the absence of advertising on the part of engine manufacturers, prospects are likely to accept what the plane manufacturer recommends. With education as to merit of engines, prospects will have preferences of their own which the plane manufacturer will find it advantageous to meet.

One outstanding advantage to any parts maker in consumer advertising is that it will enable him to continue to produce quality merchandise and not be forced by price competition to reduce his quality. Some of the great names in automobile parts and accessories have found this at times a matter of vital importance.

Tires have already won recognition in the passenger-car field. The airplane presents some distinct problems to which tire manufacturers are giving much attention. Advertising has the same opportunity for success in the airplane field as in the automotive, and reputation won on tires for planes will react favorably on tires for passenger cars.

Air Transportation

Air transport companies who have reduced rates need volume and need it quickly. They know they have reduced their rates, but does the public know it? Do people generally know that they can travel from New York to Los Angeles and make many other trips for about the same cost as by first-class train? Advertising on the part of transport companies to acquaint the public with their low rates, to inspire people with the joy of flying over their lines, and to inspire confidence in their service, their planes and pilots, the sights to be seen from their planes and the points of interest easily reached from their stations, can produce this volume.

Advertising, to be sure, will increase the expense, but the great expense of overhead, terminals and ground services is already incurred. Extra travel produced by advertising will be clear profit so far as these items are concerned, and if extra planes and pilots are required, with overhead already taken care of, they will pay their way.

The summer season, with its vacation travel, furnishes an exceptionally good time to get the service in full swing and gain momentum to carry over the winter months.

The market for air routes wherever located is essentially national. Those who travel by air are attracted to long distances, and intercity trips such as Cleveland to Detroit, Chicago to Kansas City, Los Angeles to San Francisco and numberless other intercity routes, as well as transcontinental routes, have the entire United States as their market. Many plan their trips and some buy tickets for these intercity trips while they are still at their homes a thousand miles or more away. Hence intercity service as well as transcontinental routes will find national advertising an effective medium.

Schools

Schools can use national advertising with advantage. Up to the present, schools have pretty well monopolized the teaching of flying, but less expensive and more casual methods are likely to cut into their market. One flyer will teach another the practical operation of a plane. There is, however, the opportunity for a school with exceptional facilities to acquaint the public with what it means to be a graduate of that school.

In the last analysis, in the air a rider's safety depends on the judgment and skill of the pilot, and the public can be taught to inquire what is back of the pilot to whom they intrust their safety. Through advertising, a school can make it possible for it to mean something when a pilot says, "I am a graduate of X school," or wears the badge of the X school; can make it mean something worth while to a transport company to employ pilots who are graduates of X school; can make it mean something to a young man's relatives and associates when he goes to X school for a course in aviation. All this will build prestige for the school and make it the desire of every ambitious young man who enters aviation to attend that school if it is in any way practical to do so. In this way a school can create and maintain patronage in spite of price-cutting competition and all forms of casual instruction.

In law and in medicine, certain schools are outstanding. To say one is a graduate of one of these schools carries prestige and often secures business

advantage. These colleges have every year many more applicants than they can receive. They may pick their students. Their tuition rates are not questioned. The reputations of these schools have been half a century or more in the making. But an aviation school can hardly wait half a century to win recognition. It wants to serve the present generation. It does not need to wait half a century. If it has superior advantages to offer, it may, by national advertising, in a brief time, win recognition for its exceptional merit and obtain for its graduates preferential treatment.

Airports

Large airports can likewise use national advertising to advantage. A large airport has a substantial investment in real estate augmented materially by investment in equipment. This can pay a profit only through volume. The airport has many services to sell—landing fees from transport planes, rentals from schools and sales agencies, concessions for restaurants, telegraph offices, soda fountains, sale of gas and oil, repair service and housing in hangar, but all these can return an income only through volume, and the market for its services is as broad as the United States.

The real utility of a plane is for a long-distance hop. Hence, plane owners wherever they live are prospective purchasers of services. The traveling public, too, as it makes hops by transport routes will take on added interest in an airport of which it has read, will try to see this airport, will go down earlier or linger longer to enjoy the facilities and get the inspiration of the activities. An airport which has attractiveness to sell can reach a market through national advertising and can gain those more vague but none-the-less real advantages of being known by the whole American public, so that wherever mentioned, the thought is registered by the listener: "I have read about that airport and I wish I might see it." Out of such reputations are national successes builded.

Materials and Equipment for Airports

Those who furnish materials and equipment for airports and airways can use national advertising profitably. More than 1,500 airports have been purchased; around 1,400 other airports are listed as proposed. Few, if any, are completely equipped. With a few exceptions, most of them have ahead of them a task in building runways and erecting hangars. Many have immediate problems of drainage and grading. Much work is projected for the summer of 1930, and since many of these ports are municipally owned, it may be presumed, especially in view of the urging of the Hoover employment program

upon cities to do construction work this year, that there will be considerable activity in airport improvement during 1930.

Those who have cement, asphalt or other materials for runways and hangar aprons, steel or other products for hangar construction, lighting or other devices for airport equipment can find markets through national advertising. Perhaps some manufacturer may inquire, "Why try to sell the whole American public when my problem is to sell a limited number of airports?" The answer is that a large part of the American public are factors in making those sales. Many ports are municipally owned and equipment must be paid for out of taxes. Officials will be more inclined to make improvements if urged by the public.

If the American public were conscious of what the airports of the United States need to have done, it would mean much to aviation and to equipment manufacturers. Through advertising, the public in each city will learn what their airports need; some will urge the needed improvements, others will offer no objections to expenditures for which they understand the need. All will be the more willing to nod approval when the brand with which they are familiar is used.

Gas, Oil and Supplies

Gas, oil, and other supplies for aviation can be effectively promoted by advertising. Certain varieties of gas and certain varieties of oil are considered by experts especially adapted to aviation, but the public knows nothing about this. Advertising on the part of those whose products are superior for use in airplanes can win a deserved leadership in an industry of much importance and at the same time can strengthen their prestige in the entire automotive field.

Lighter-Than-Air Craft

Lighter-than-air craft have much to tell the public. While the market is at present a "thin market," yet the value of public interest in, and public appreciation of, lighter-than-air craft is great. For upon public appreciation depends popular approval of special appropriations for the construction of dirigibles for military use, the incentive of corporations to build giant passenger ships and the acceptability of small ships for private use.

Special Services

Those with special airplane services, such as photography and dusting, have an opportunity through advertising of letting the public know what they

have to offer. These services are novel and can easily attract and hold attention. The extent and location of their potential markets are unknown. National advertising probably would not only add to their prestige and attract new customers in the fields in which they have been operating, but would probably open up new fields which had not been foreseen.

Coöperative Advertising

The greatest need of aviation is to convert rooters into personal flyers, and this is a task in which coöperative advertising can perform a valuable service. As pointed out elsewhere, 1930 is likely to be a crucial year, and it is a matter of much importance that advertising to convert enthusiasm into patronage be undertaken at once. If a coöperative organization, either one already in existence or one created for the purpose, can be authorized to raise funds and conduct such an advertising campaign, it can do that which will help every branch of the industry. Coöperative advertising will not replace the need for individual advertising. Manufacturers will find it to their advantage to promote their individual products and brand names whether or not a coöperative advertising campaign be conducted. The advertising of individual firms will reënforce and prove helpful to a general campaign and, on the other hand, individual firms will be greatly helped by such a campaign.

Industry Essentially National

In general, it may be said that new industries have all used national advertising to build their markets—the automobile, electric refrigeration and radio have made national advertising the basic factor in their sales program. Older industries—foods, toilet goods, shoes and many others—have turned from old-time methods to national advertising. The newest of the great industries is aviation, and in its very nature it is more national than any industry which has preceded it. To function at all it requires nation-wide facilities. Airplanes have made the United States one compact neighborhood. The most effective and least expensive advertising medium for this most national of industries is national advertising.

CHAPTER XXXI

VACATIONS BY AIR

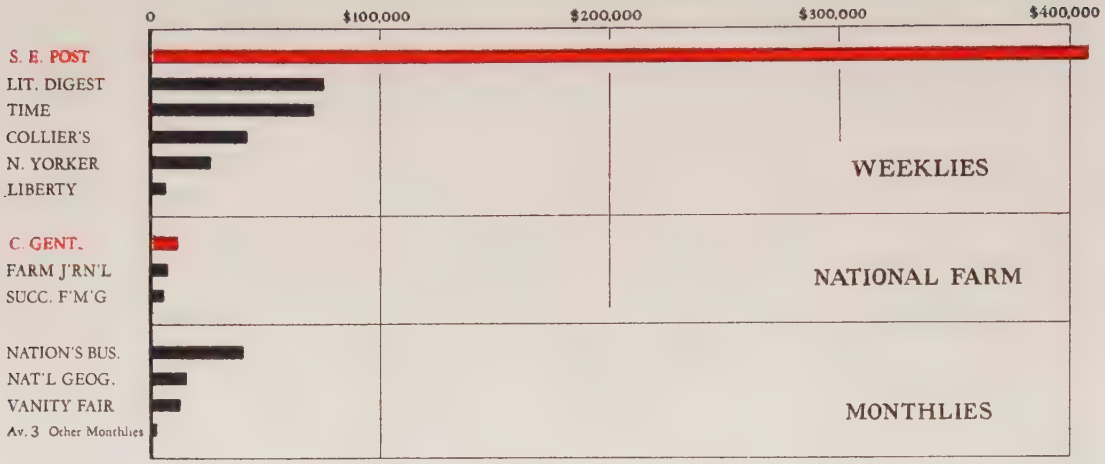
WE BELIEVE the appeal to take vacations by air offers an exceptional advertising opportunity. Many people properly feel that the brief interlude from daily toil allotted them for vacation can be made to count for most in mental and physical refreshment by some adventure with a wholesome thrill to it; something which can be told with enthusiasm to associates upon their return and which can be remembered with pleasure throughout the ensuing year, in fact can be remembered with pleasure for many years thereafter.

For such a vacation many are willing to pay a little more—they are not purchasing mere transportation, they are buying joy. To many who have held to routine tasks for a twelvemonth, what could be a more real vacation than to get into the fresh stimulating air above the clouds, to get to some place which heretofore has seemed too far away for a short vacation, to return mentally invigorated and with a story of adventure and perhaps with pictures from the air which may well incite the envy of those who have repeated again a conventional vacation?

Fear is less of a deterrent factor in vacation trips. In the happy anticipations of an unusual vacation trip, racial fears are overcome—"For once," the average citizen says, "let's make a great adventure." That there is some sense of fear and of the heroic, adds to the thrill. As Mr. Average Citizen and his wife on their vacation trip ride in the air with safety and pleasure and see airships arriving and departing from various airports filled with other joyful vacationists, the great adventure begins to seem less daring, less extraordinary, although none the less enjoyable; Mr. Average Citizen is started on the route to being a regular patron of air transportation.

ADVERTISING 1929

AVIATION



PASSENGER CARS

Figures Based on 35 National Publications Checked by The Advertising Record Company, Chicago.

CHAPTER XXXII

CURTIS PUBLICATIONS AND AVIATION

CURTIS PUBLICATIONS in their editorial departments, ever alert to constructive influences in American life, have taken a keen interest in aviation and, in the opinion of many we met in our interviews, have presented many of the outstanding articles on various phases of the industry. A list of some of the more important articles on aviation and also a list of fiction in which aviation has been featured are shown on the following five pages.

The Saturday Evening Post Articles on Aviation

Name of Article	*Author*	*Date*
Exploring the Maya with Lindbergh	*William I. Van Dusen*	1930—Jan. 11 and Feb. 1
Air Transport	*Charles A. Lindbergh*	February 1
The Gold Rush in the Air	*Howard Mingos*	1929—January 26
All in a Day's Work	*Casey Jones*	February 2
Airports	*Com. R. D. Weyerbacher*	February 23
The Railroads Enter Aviation	*Gen. W. W. Atterbury*	March 30
Fall Guys	*Dick Grace*	April 6 to 20
Linking the Americas	*James Warner Bellah*	April 20
Flying With Both Feet Off the Ground	*James Warner Bellah*	May 18
Aviation's Third Decade	*Com. R. D. Weyerbacher*	May 25
Five Years More of Flying	*Howard Mingos*	June 29 and July 6
Boats With Wings	*Com. R. D. Weyerbacher*	July 27
Frozen Gold	*Courtney Ryley Cooper*	September 21
Is Air Travel Safe?	*Donald E. Keyhoe*	October 5
A New Way to Fly	*Juan de la Cierva*	November 2
Flying Blind	*Donald E. Keyhoe*	November 9
Flying and Eating My Way East	*Will Rogers*	1928—January 21

Name of Article	*Author*	*Date*
Bucking a Head Wind	*Will Rogers*	1928—January 28
Don't Let Them Die	*Com. Richard E. Byrd*	May 26
Industry at the Joy Stick	*Com. R. D. Weyerbacher*	June 16
Aircraft Carriers	*Rear-Admiral T. P. Magruder*	June 23
Flying with Lindbergh	*Donald E. Keyhoe*	May 19, June 2 and 23, July 21
Thus Man Learned to Fly	*Howard Mingos*	July 7 and July 14
Trunk Liners of the Air	*Com. R. D. Weyerbacher*	August 18
Flying the Frontiers	*Arthur Hunt Chute*	October 6
Military Aircraft—1928 Model	*Com. R. D. Weyerbacher*	November 17
The Zeppelins	*Ernst A. Lehmann and Howard Mingos*	1927—April 9 to June 25
Safety in the Air	*Harry F. Guggenheim*	June 25
And Then I Jumped	*Charles A. Lindbergh*	July 23
The Common Carrier Hops Off	*Com. R. D. Weyerbacher*	July 30
Five Fallacies of Aviation	*William B. Stout*	September 10
Accelerating Sentiment	*William H. Pickens*	Oct. 29, Nov. 26 and Dec. 24
Getting Into Aviation	*Helen Kay Schunck*	November 5
Air-Traveled Germany	*W. Jefferson Davis*	November 19
The X in Exploration	*Com. Richard E. Byrd*	December 31
Gypsying the Jennies	*Charles G. Reinhardt*	1926—January 9
A Borgia of the Air	*Harris Dickson*	May 1
Aviation Comes Out of a Tail Spin	*Wesley Winans Stout*	May 8
Why Men Go Up in Balloons	*Corley McDarment*	July 17
What's Up	*Corley McDarment*	October 9
Revising the Rules of Air Warfare	*Editorial*	October 30
Speed Wings	*Lt. Al. Williams*	Oct. 30 and Nov. 6
American Leadership in Aeronautics	*Brig.-Gen. Wm. Mitchell*	1925—January 10
Aircraft Dominate Seacraft	*Brig.-Gen. Wm. Mitchell*	January 24
A Fire Brigade on Horseback	*Agnes C. Laut*	January 31
Civil and Commercial Aviation	*Brig.-Gen. Wm. Mitchell*	February 7
How Should We Organize Our National Air Power?	*Brig.-Gen. Wm. Mitchell*	March 14

Name of Article	*Author*	*Date*
This Aviation Business	*Wesley W Stout*	1925—March 21
A Balanced Navy	*Curtis D. Wilbur*	April 18
Limitation of Naval Armament	*Curtis D. Wilbur*	May 23 and 30
Leap and Live to Leap Again	*Corley McDarment*	July 11
Europe Takes to the Air	*F. Britten Austin*	August 29 and September 5 and 19
Stunt Flying	*Al Wilson*	September 19
With the Shenandoah	*Lt.-Com. Zachary Lansdowne, U. S. N.*	October 24
Flyers and Storms	*Capt. Conrad Westervelt*	December 5
Stepping Out Into Space	*Corley McDarment*	1924—November 29
Aeronautical Era	*Brig.-Gen. Wm. Mitchell*	December 20
Life on the Shenandoah	*Capt. Stanford E. Moses*	December 20
Air to Let	*Lt.-Col. Davis and Wm. H. Hamby*	1923—March 3
Europe in Transition	*Isaac F. Marcosson*	1922—February 4
The Navy That Flies	*Josephus Daniels*	1921—April 23
Flying Made Easy	*Kenneth L. Roberts*	May 14
The Three Plane Navy	*Edward G. Lowry*	June 11
Exit the Happy Warrior	*Edward G. Lowry*	June 25
It Looks Easy	*Homer Croy*	November 5
Air Supremacy	*Floyd W. Parsons*	1920—February 21
Clipping the Wings of the Eagle	*Benedict Crowell and Donald Wilhelm*	August 14
Commercial Aeronautics	*Floyd W Parsons*	August 14

The Saturday Evening Post Stories on Aviation

Name of Story	*Author*	*Date*
A Man With Judgment	*Leonard H. Nason*	1930—January 25
He Got Annoyed	*Austin Parker*	1929—February 2
Crash or Credit	*Richard Howells Watkins*	February 16
Angela	*Austin Parker*	June 22
Love Story	*Austin Parker*	November 23
Our Distant Cousins	*Lord Dunsany*	November 23
Lighter Than Air	*Everett H. Clark*	December 28
'Fraid Cat	*Austin Parker*	1928—January 7 and 14

Name of Story	*Author*	*Date*
Poor But Proud	*Austin Parker*	1928—February 4
Galahad Himself	*Fanny Heaslip Lea*	March 31
The Door Marked D	*Will Levington Comfort*	March 31
The Blandings	*Austin Parker*	May 26
The Cities of the World	*James Warner Bellah*	June 16
The Untamed	*Austin Parker*	September 8
The MacGillicuddie	*James Warner Bellah*	1927—January 15
Funny Nose	*James Warner Bellah*	February 5
Blood	*James Warner Bellah*	April 2
The Great Tradition	*James Warner Bellah*	May 28
Trees Aren't Safe for Birdies	*Austin Parker*	June 4
He Man	*Marjory Stoneman Douglas*	July 30
Stormy	*Austin Parker*	September 24
Up for Glory	*Richard Howells Watkins*	December 10
Sarah's Jimmy	*Austin Parker*	1926—June 26
Ann 'n' Andy	*Austin Parker*	November 6
Fear	*James Warner Bellah*	November 6
At 2:42 A.M.	*James Warner Bellah*	December 18
On the Flagship	*F. Britten Austin*	1925—June 13
Forced Landing	*Austin Parker*	1924—March 1
The Umpty-Seven	*Austin Parker*	March 15
The Happy Landing	*Austin Parker*	June 7
Babs the Unbeatable	*Austin Parker*	1923—June 30

Journal Articles on Aviation

Name of Article	*Author*	*Date*
The "Little Flyin' Fool"	*Dorothy Jackson Parmer*	1920—April
The Spirit of Youth in the Air	*Alice Ames Winter*	1926—March
This Hero Business	*Lieut.-Com. Richard E. Byrd*	1927—January
Great French Ace Hails Lindbergh	*Paul Tarascon*	August
The Ladies Take the Air	*Howard Mingos*	1928—May
Flying Across America	*Myron M. Stearns*	1929—January
Flying Across the Atlantic	*Lady Drummond Hay*	January
Promoting Peace Through Preparation for Defense	*Calvin Coolidge*	April
Aviation for You and for Me	*Ruth R. Nichols*	May

Name of Article	*Author*	*Date*
Flying for Sport	*Ruth R. Nichols*	1929—September
Air Vacations	*Howard Mingos*	1930—March

Journal Stories on Aviation

Name of Story	*Author*	*Date*
Valor	*Arthur T. Munyan*	1928—September
The Lady-Killer	*William MacHarg*	1929—April
A Ring from London	*Arthur T. Munyan*	July
Bunch Gets a Break	*Sewell Ford*	1930—February

The Country Gentleman Articles on Aviation

Name of Article	*Author*	*Date*
Flying With the Air Mail	*Samuel Taylor Moore.*	1925—February 7
Adventures in the Air Mail	*Burt M. McConnell.*	June 27
New Methods in Arctic Exploration	*Burt M. McConnell.*	July 18
The Outdoor Boy—A Simple Airplane	*Percy Pierce.*	1926—April
Airplanes for Peace.	*William B. Stout.*	November
Flivvers of the Air	*William B. Stout.*	December
Farming From the Air	*E. H. Taylor.*	1927—November
New Wings for Safe Flying	*Glenn H. Curtiss, as told to Howard Mingos*	1928—September
Blazing America's Air Trails	*Gove Hambidge*	1929—January
Livestock—Airplanes and Sheep	*O. A. Fitzgerald*	April
How I Learned to Fly.	*Marvel Crosson*	September

In addition to the articles listed above, there were other articles mentioning aviation, such as the following:

Name of Article	*Author*	*Date*
A Completely Motorized Farm	*Philip S. Rose*	1920—February 28
Poco Moonshine.	*John R. McMahon*	May 8
Twenty Weevils and the Cotton Patch.	*J. Sidney Yates*	1925—April 11
The Spirit of the Southwest	*Gove Hambidge*	1930—January

The Saturday Evening Post

The Saturday Evening Post in 1929 has carried the major portion of the advertising revenue placed by the aviation industry in national publications. This is in line with the experience of the automotive industry.

The Saturday Evening Post offers a unique opportunity for an aviation manufacturer to reach his market. In the first place, The Saturday Evening Post reaches executives in all lines of business—manufacturers, bankers and merchants—and is considered by them more carefully than is any other publication. Here is the group whose judgment determines the encouragement or discouragement of dealers, distributors, manufacturers and transportation executives.

In the second place, the advertising pages of The Saturday Evening Post are studied by the automotive industry—automobiles, tires, trucks, tractors, parts, accessories and aviation. In the pages of The Saturday Evening Post is a unique opportunity to win acquaintance and appreciation among thoughtful persons in stations high and low in the great family of industries of which aviation is the youngest member.

In the third place, the advertising pages of The Saturday Evening Post are more closely followed by advertising men than those of any other publication. The advertising industry is manned largely by young men, men with imagination, whose look is forward, who see things not only as they are but as they may become. In youth and enthusiasm the advertising industry comes nearer than any other to matching the personnel of the aviation industry.

This group of many thousands who look over the advertising pages of every issue of The Saturday Evening Post is in itself a potential market of no mean proportions and one which by its example and by its appreciation can do much to build prestige for a manufacturer. Advertising men travel much—they talk entertainingly. If air transportation companies can win this market to make trips by plane, it will help toward universal air travel.

In the fourth place, The Saturday Evening Post is probably read by more young men in college than is any other publication. In practically all college towns the circulation of The Saturday Evening Post has more than its normal ratio to population. In many colleges where advertising is taught, The Saturday Evening Post is used as a textbook. The Saturday Evening Post, edited for those on the way up, has in its articles and in its fiction and in its advertising pages a strong appeal to young men. The education of these young men to believe in a firm and its products may have far-reaching effects in personnel won and held and in widely disseminated knowledge and appreciation.

Finally, The Saturday Evening Post more universally than any other publication influences all classes in the United States. In the first place, The Saturday Evening Post covers intensively those with larger incomes. In an every-home survey of a city of about 100,000 population, The Saturday Evening Post was found in almost two out of every three homes with incomes in excess of $5,000; in three out of every four homes of executives; in approximately two out of every three homes of professional people; in approximately two out of every three homes of wholesalers and large retailers.

In addition to this intensive coverage of those with larger incomes, The Saturday Evening Post also reaches in an effective manner the classes with lesser incomes. In the city survey referred to above, The Saturday Evening Post was found in almost every second home with incomes from $2,500 to $5,000 and in more than one home out of four with incomes from $1,800 to $2,500. It was found in almost every second home of traveling salesmen and in more than one out of every four homes of skilled workmen.

In judging of the value of circulation to those of lesser income, two facts should be borne in mind. First, a consequential part of the airplane market, even at the prices which were current before 1930, came from homes with incomes under $5,000. More than 40 per cent of the non-commercial owners, more than 50 per cent of the commercial owners, and more than 60 per cent of the students who answered our questionnaire (Appendix E) reported incomes of self or family as less than $5,000. Second, the thinking of the masses largely determines the brand of articles purchased in all those classes of merchandise which are displayed to the public.

In 1914 we expressed a belief that an appreciative audience was an important factor in building a market for automobiles, that some might buy a box at the grand opera with its distinguished audience who would not pay the price merely to hear the music and that many might buy a better car if the masses would applaud their judgment.

We said in the Automobile Report in 1914: "Had greater pains been taken to educate the masses to appreciate the style qualities of the high-grade car and to stimulate their applause, a larger number of purchasers could probably have been held in line; for a large part of the satisfaction that a man gets from the possession of a high-priced car is in the plaudits of the multitude."

We believe that the experience of the past sixteen years has fully justified that opinion. The plaudits of those who could not aspire to ownership did much to build markets for Cadillac, for Packard and for Lincoln. Many high-grade automobiles started—several had great promise—those who succeeded advertised to the masses.

It is even more true today of the sale of airplanes or of trips over air transport lines that the education of relatives, of business associates and of the masses generally is an essential factor. Many a man today is deterred from travel by air and many a young man is deterred from the purchase of a plane by the belief that relatives, friends and business acquaintances will not approve his judgment; some young men in the purchase of planes require financial assistance from their fathers.

A large market for air travel and for airplanes can be attained only through education of the entire American public, and the pages of The Saturday Evening Post in a unique way make possible this education.

Ladies' Home Journal

The Ladies' Home Journal in its editorial pages has presented outstanding articles on women and aviation. Many women, as stated in the chapter on Women and Aviation, are not afraid to fly and may be sold on using air transportation for many of their trips. On the other hand, many women deter their husbands and sons from flying and much would be accomplished for aviation if the objections of a considerable portion of these could be removed.

In advertising to the women's field, Ladies' Home Journal has for many years occupied a position of unquestioned leadership. In the automotive industry in 1929, Ladies' Home Journal carried nearly twice as much advertising revenue as any other woman's publication.

The Country Gentleman

The Country Gentleman has featured articles on farm uses of airplanes. Farmers, as stated in the chapter on Farmers and Aviation, offer one of the best potential markets for the sale of airplanes. They have both the room and the need for planes. Furthermore, young men from the farm furnish many of the students for aviation schools.

In advertising to the farm field, The Country Gentleman occupies an outstanding position. In 1929, from the various automotive industries, The Country Gentleman carried more advertising revenue than any other six national farm publications combined.

CHAPTER XXXIII

FUTURE OF THE INDUSTRY

AVIATION is an industry of unusual promise and with more than usual difficulties to overcome. It would be a rash person who would put any limitations on the future developments of aviation either in transport of passengers and freight or in the private use of planes.

The opportunities of the industry for service to the nation and for broadening and quickening the lives of individuals are so great that one's mind balks at trying to believe the developments which may take place and at the revolutionary changes in national and world thought and life which the industry may make.

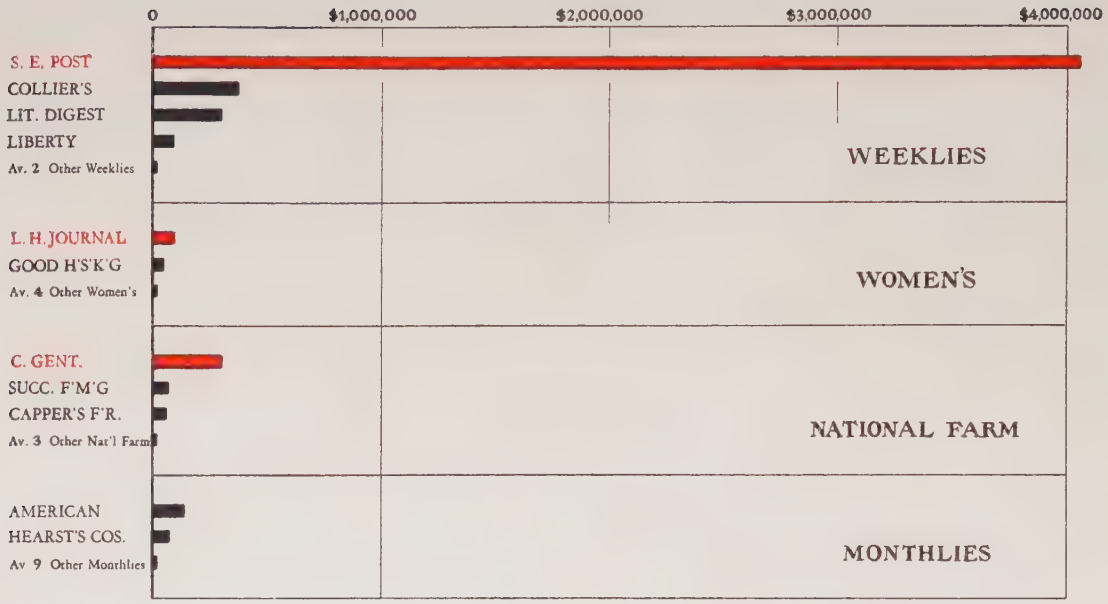
On the other hand, the difficulties to be overcome are also exceptional, for in addition to all the usual difficulties of financing, engineering and sales development presented by new industries in the past, the industry has fear to overcome and also to more than an usual degree has the necessity of developing expensive services on a nation-wide scale before it can begin to function effectively.

Because of the unusual problems involved, the speed with which the industry may develop cannot be judged with accuracy; it is quite possible along its route there may be periods of discouragement where financial support may falter and public sentiment may seem to turn away, but we are confident if any such periods occur they will be only temporary.

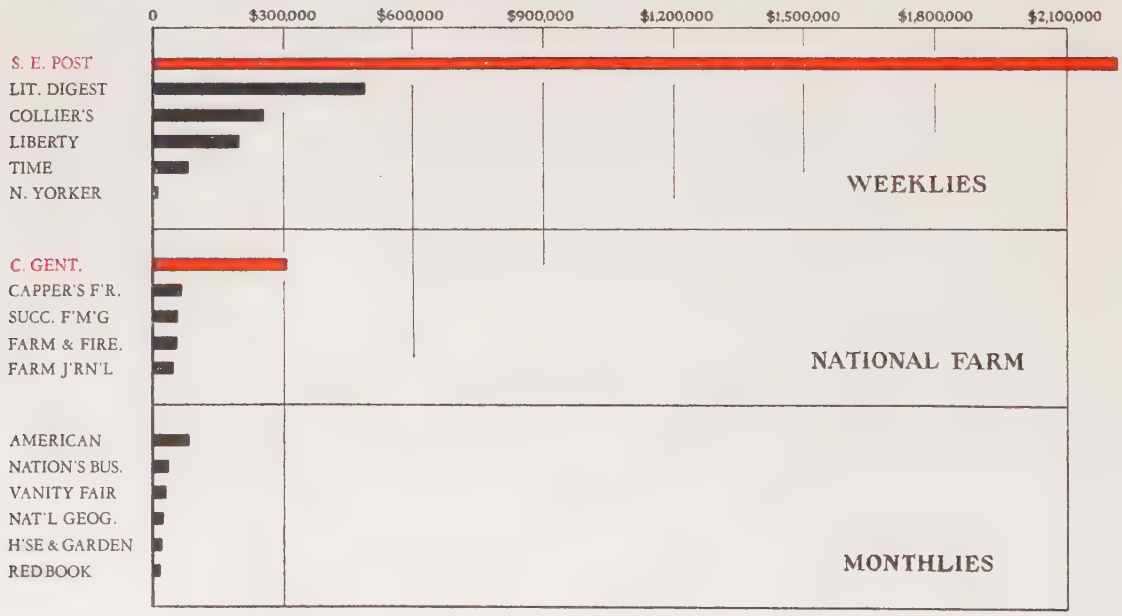
In concluding this report we can say of aviation what we said of the automobile industry in the concluding paragraph of the 1914 report: "Many difficulties have been encountered, but out of these difficulties there will emerge a great and powerful industry, sound and stable, efficient in manufacturing, and with its merchandising methods safely founded on the firm rock of national advertising."

ADVERTISING 1929

AUTOMOTIVE UTILITIES



TIRES



Figures Based on 35 National Publications Checked by The Advertising Record Company, Chicago

APPENDIX A

PRELIMINARY STATEMENT

IN AN endeavor to ascertain the attitude of owners and prospects of planes as to what they wanted in a plane, we sent two mail questionnaires.

(A) One questionnaire was sent to all listed owners of planes. We received 1,189 replies which were tabulated in two groups—565 "commercial," where the reply appeared to indicate that the plane was used primarily for commercial purposes and 624 "non-commercial," where the reply indicated that the plane was used primarily for some purpose other than commercial aviation. Of the 624 "non-commercial" about 23 per cent as shown in Appendix F, reported some connection with the aviation industry.

(B) Another questionnaire was sent to 1,000 students listed as enrolled in aviation schools, to which 253 replies were received.

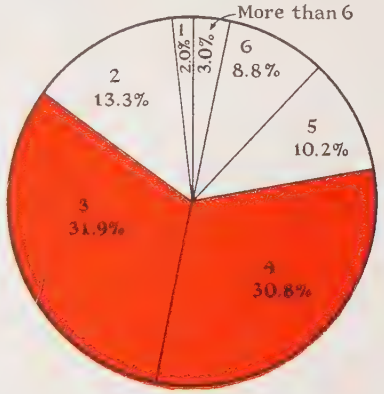
To both these groups a number of questions were submitted, about half of which were worded identically. In the following pages are presented the figures that appeared the more significant in each group. Owners are presented by the two groups, non-commercial and commercial. Charts accompanying this Appendix are based on all owners, that is, on non-commercial and commercial owners combined unless otherwise indicated; hence the charts present figures not given in the tables.

A question in regard to financial status of the individual reporting or of his family was quite generally answered. Where financial status appeared to affect attitude, notation to that effect is made in some way.

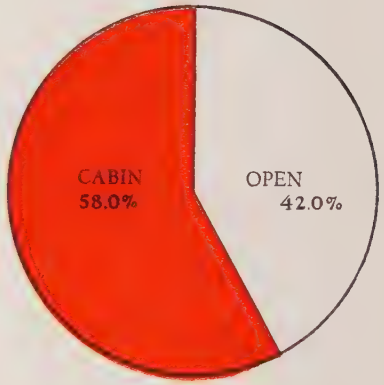
PREFERENCE OF OWNERS

COMMERCIAL AND NON-COMMERCIAL COMBINED

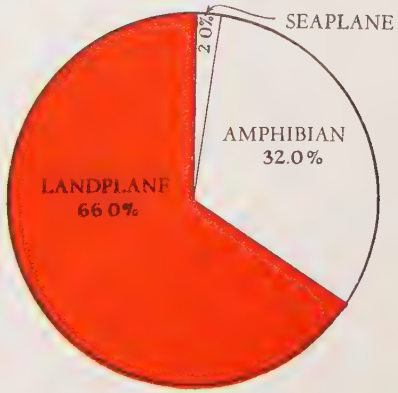
NUMBER OF PLACES



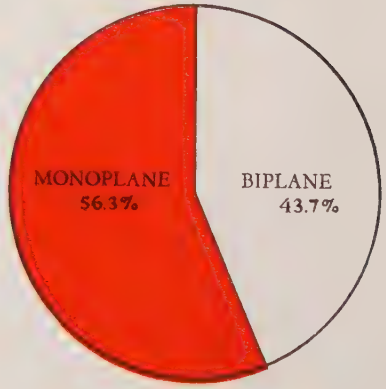
CABIN OR OPEN



TYPE OF PLANE



TYPE OF WINGS



APPENDIX B

WHAT TYPE OF PLANE IS WANTED

WHAT would you consider ideal for your purpose if you could have a plane built just to suit you?

An epitome of the answers from both owners and students is: Three or Four Place Cabin landplane, monoplane, with dual controls and single 150-300 horse-power engine, having a cruising speed of 95-100 miles per hour but capable of 125-130 miles per hour.

Each of the points is discussed briefly below.

Number of Places

On number of places, approximately two-thirds favored either three-place or four-place, the choice of owners being about equally divided between the two.

	OWNERS		
	Non-Commercial	Commercial	Students
One-place	2.5%	1.6%	1.7%
Two-place	16.3	9.8	16.8
Three-place	33.4	30.2	37.8
Four-place	31.5	30.2	30.7
Five-place	6.1	14.7	4.2
Six-place	7.9	9.8	7.1
Over six-place	2.3	3.7	1.7

The expression of opinion favorable to four-place appears more significant when contrasted with the fact that of planes at present owned, nearly two-thirds were three-place and only 3 per cent were four-place.

Open or Cabin

	OWNERS		
	Non-Commercial	Commercial	Students
Cabin	55.9%	60.5%	52.8%
Open	44.1	39.5	47.2

Planes at Present Owned

	Non-Commercial	Per Cent	Commercial	Per Cent
One-place	54	8.9	33	5.0
Two-place	139	23.0	102	15.5
Three-place	346	57.1	461	69.8
Four-place	17	2.8	17	2.6
Five-place	15	2.5	24	3.6
Six-place	13	2.1	16	2.4
More than six-place	22	3.6	7	1.1
Total	606	100.0	660	100.0

Land, Amphibian or Boat

Approximately one-third preferred some kind of amphibian.

	OWNERS		
	Non-Commercial	Commercial	Students
Landplane	64.6%	67.4%	65.3%
Amphibian multipassenger	8.2	8.1	11.3
Amphibian, small light	26.0	21.8	23.0
Seaplane and flying boat	1.2	2.7	0.4

Monoplanes or Biplanes

Monoplanes had a majority of the preference in all groups, but over 40 per cent of each group, if they could have what they wish, would like a biplane.

	OWNERS		
	Non-Commercial	Commercial	Students
Biplane	43.2%	44.2%	44.1%
Monoplane	56.8	55.8	55.9

Single or Dual Control

Dual control had a three-quarters preference in all groups.

	OWNERS		
	Non-Commercial	Commercial	Students
Dual control	76.0%	84.7%	77.2%
Single control	24.0	15.3	22.8

Number of Engines

The preference as to number of engines was unmistakably in favor of a single engine.

	OWNERS		
	Non-Commercial	Commercial	Students
One engine	86.1%	85.4%	92.1%
Two engines	10.4	11.1	5.4
Three engines	3.5	3.5	2.5

Cruising Speed

Cruising speed of 100 miles or less was the favorite speed of the majority.

	OWNERS		
	Non-Commercial	Commercial	Students
Under 95 miles per hour	14.2%	12.6%	17.3%
95–100 miles	37.7	38.3	34.6
105–110 miles	11.2	11.7	14.8
115–120 miles	13.4	16.2	15.6
125–130 miles	12.1	13.2	11.0
135–140 miles	3.9	2.2	1.7
145–150 miles	5.5	4.2	3.8
Over 150 miles	2.0	1.6	1.2

Horse Power

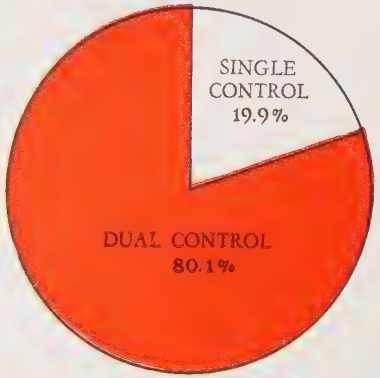
Horse power between 150–300 received nearly half of the votes of non-commercial owners and more than half the votes of the commercial owners and students.

	OWNERS		
	Non-Commercial	Commercial	Students
150 horse power or less	34.0%	29.2%	34.5%
150–300 horse power	47.5	57.9	52.2
Over 300 horse power	18.5	12.9	13.3

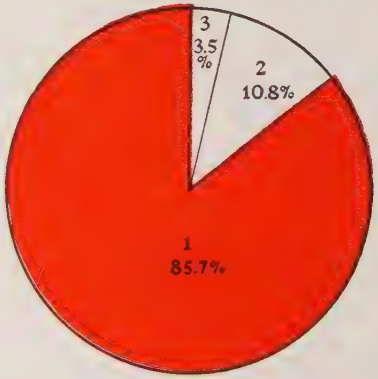
PREFERENCE OF OWNERS

COMMERCIAL AND NON-COMMERCIAL COMBINED

CONTROLS

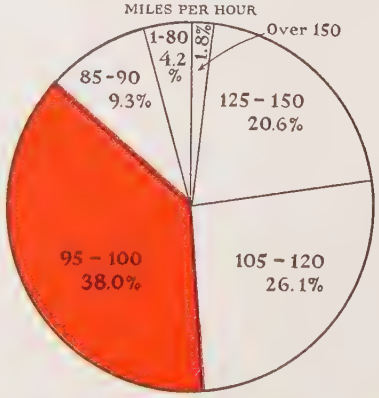


NUMBER OF ENGINES



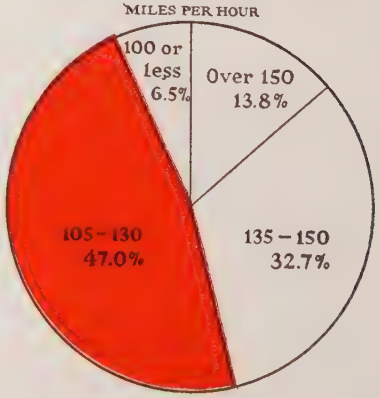
CRUISING SPEED

MILES PER HOUR



MAXIMUM SPEED

MILES PER HOUR



Maximum Speed

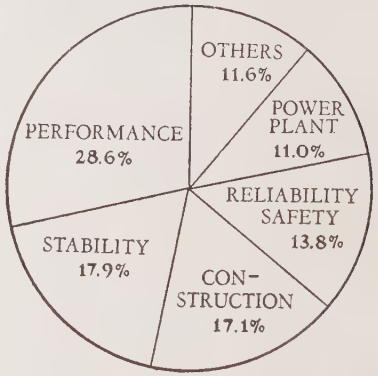
A maximum speed of 125–130 miles per hour received more votes than any other classification, but more than 45 per cent of all groups specified maximum speed in excess of 130 miles per hour.

	OWNERS		
	Non-Commercial	Commercial	Students
Under 95 miles per hour	1.5%	.4%	1.7%
95–100 miles per hour	6.6	4.5	3.5
105–110 miles per hour	4.3	6.2	5.7
115–120 miles per hour	16.4	13.5	11.7
125–130 miles per hour	25.5	28.1	31.7
135–140 miles per hour	14.7	18.5	17.0
145–150 miles per hour	14.2	18.3	16.5
Over 150 miles per hour	16.8	10.5	12.2

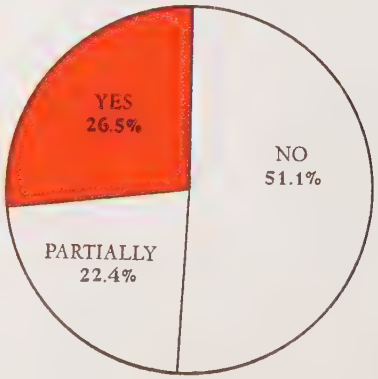
PREFERENCE OF OWNERS

COMMERCIAL AND NON-COMMERCIAL COMBINED

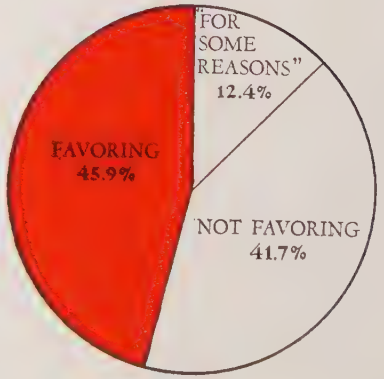
FACTORS DESIRED IN NEXT PURCHASE



INFLUENCED BY STYLE



FOLDING WINGS



APPENDIX C

FACTORS OF IMPORTANCE IN CHOOSING A PLANE

Reason for Choice of PRESENT Plane

	OWNERS					
	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
Price	169	22.8	103	15.3	32	9.4
Reputation	138	18.6	128	19.0	43	12.6
Performance	107	14.4	147	21.9	67	19.6
Type suited to use	89	12.0	94	14.0	30	8.8
Construction	59	8.0	63	9.4	50	14.7
Reliability—Safety	51	6.9	16	2.4	32	9.4
Good training plane	38	5.1	33	4.9	4	1.2
Maneuverability	37	5.0	15	2.2	22	6.4
Stability	27	3.7	38	5.7	35	10.3
Power plant	12	1.6	11	1.6	11	3.2
Nearness to factory for repair and delivery	7	1.0	14	2.1	3	.9
Appearance	4	.5	6	.9	3	.9
Visibility	3	.4	1	.2	2	.6
Load	..	..	3	.4	7	2.0
Total	741	100.0	672	100.0	341	100.0

Factors Desired in NEXT Purchase

What qualities in a plane are most important to you?

First Choice

	OWNERS					
	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
Performance	143	24.7	175	32.9	38	15.5
Stability	115	19.8	84	15.8	56	22.9
Reliability—Safety	96	16.6	57	10.7	46	18.8
Construction	88	15.2	102	19.2	41	16.7
Power plant	75	12.9	48	9.0	43	17.6
Maneuverability	24	4.2	32	6.0	9	3.7
Price and upkeep	23	4.0	12	2.3	4	1.6
Load	6	1.0	9	1.7	..	..
Reputation	4	.7	4	.7	2	.8
Appearance	2	.3	5	.9	1	.4
Ease of maintenance	2	.3	2	.4	..	..
Visibility	2	.3	2	.4	5	2.0
Total	580	100.0	532	100.0	245	100.0

Second Choice

	OWNERS					
	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
Performance	179	32.7	207	40.2	56	23.3
Construction	93	17.0	79	15.3	45	18.8
Maneuverability	75	13.7	46	8.9	31	12.9
Stability	69	12.6	70	13.6	45	18.8
Power plant	48	8.8	28	5.5	21	8.8
Price and upkeep	40	7.3	30	5.8	13	5.4
Reliability—Safety	24	4.4	15	2.9	13	5.4
Load	5	.9	10	1.9	4	1.7
Visibility	5	.9	7	1.4	7	2.9
Appearance	4	.7	5	1.0	1	.4
Ease of maintenance	3	.5	8	1.6	2	.8
Reputation	3	.5	10	1.9	2	.8
Total	548	100.0	515	100.0	240	100.0

Third Choice

	OWNERS					
	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
Performance	158	32.6	135	28.2	52	23.0
Construction	72	14.8	72	15.0	49	21.7
Maneuverability	54	11.1	62	13.0	32	14.1
Price and upkeep	44	9.1	51	10.7	19	8.4
Stability	41	8.5	41	8.6	16	7.1
Power plant	34	7.0	24	5.0	16	7.1
Reliability—Safety	25	5.2	20	4.2	10	4.4
Appearance	19	3.9	20	4.2	16	7.1
Load	12	2.5	12	2.5	2	.9
Visibility	10	2.1	12	2.5	8	3.5
Ease of maintenance	8	1.6	18	3.8	4	1.8
Reputation	7	1.4	11	2.3	2	.9
Minimum noise	1	.2	..	..	..	..
Total	485	100.0	478	100.0	226	100.0

Combination of Choices

	Total	Per Cent
Performance	1,143	29.7
Construction	641	16.6
Stability	537	14.0
Maneuverability	365	9.5
Power plant	337	8.8
Reliability	306	7.9
Price and upkeep	236	6.1
Appearance	73	1.9
Load	60	1.6
Visibility	58	1.5
Ease of maintenance	47	1.2
Reputation	45	1.2
Minimum noise	1	..
Total	3,849	100.0

APPENDIX D

INFLUENCE OF STYLE AND APPEARANCE

Style

Style and appearance seem to have considerable influence.

	Non-Commercial	Commercial	Students
Yes	23.9%	29.4%	29.7%
No	53.1	48.8	53.1
Somewhat	23.0	21.8	17.2
Total	100.0	100.0	100.0

Folding Wings

Do you think folding wings a good feature?

Opinion on the subject of folding wings appeared somewhat evenly divided with the balance slightly favoring folding wings.

	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
Yes	251	45.5	235	46.4	115	50.2
No	228	41.3	214	42.2	106	46.3
For some reasons	73	13.2	58	11.4	8	3.5
Total	552	100.0	507	100.0	229	100.0

APPENDIX E

STATUS OF THOSE ANSWERING

Income

What is your annual income or that of your family?

More than 40 per cent of non-commercial owners and a majority of commercial owners and of students are in the classification of incomes of less than $5,000. More than 30 per cent of the non-commercial owners had incomes in excess of $10,000.

	OWNERS					
	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
$10,000 and up	191	30.6	51	9.0	35	13.8
$5,000–$10,000	128	20.5	142	25.1	50	19.8
Less than $5,000	260	41.7	319	56.5	158	62.5
Not specified	45	7.2	53	9.4	10	3.9
Total	624	100.0	565	100.0	253	100.0

Age

The age of non-commercial owners is somewhat higher than the other two groups, a majority of them being more than 30 years of age and more than 14 per cent being over 40. Sixty-seven per cent of the lower income groups combined is under 30 years of age, as compared with 29 per cent of the highest income groups combined.

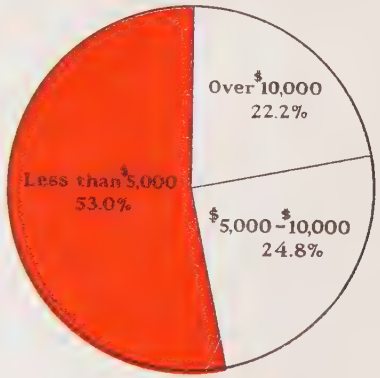
Under 20	14	2.3	11	2.0	39	15.4
20–30	279	46.3	278	50.5	147	58.1
30–40	222	36.8	221	40.2	57	22.5
Over 40	88	14.6	40	7.3	10	4.0
Total	603	100.0	550	100.0	253	100.0

STATUS OF OWNERS

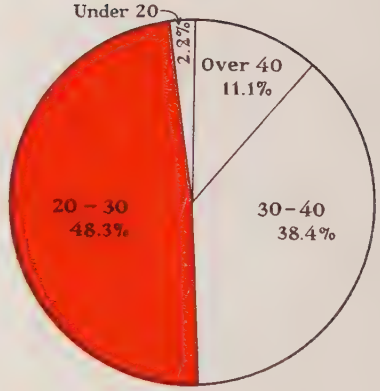
COMMERCIAL AND NON-COMMERCIAL COMBINED

INCOME

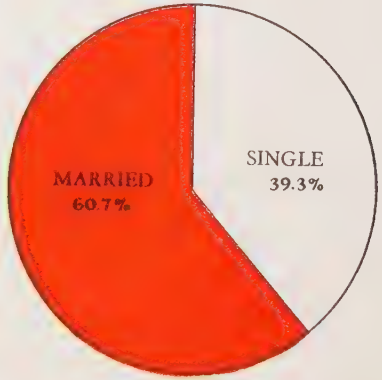
OF INDIVIDUAL OR FAMILY



AGE

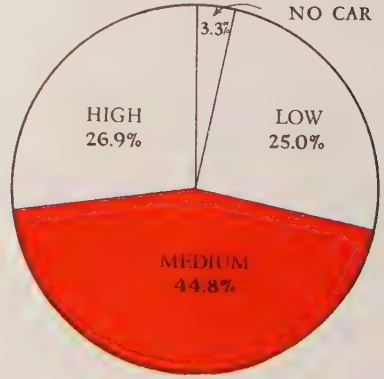


MARRIED OR SINGLE



AUTOMOBILE OWNED

CLASSIFIED BY PRICE



Married or Single

About 60 per cent of the owners and 40 per cent of the students are married.

	OWNERS					
	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
Married	332	59.8	312	61.7	97	40.1
Single	223	40.2	194	38.3	145	59.9
Total	555	100.0	506	100.0	242	100.0

Male or Female

Male	598	99.2	542	99.4	245	96.8
Female	5	.8	3	.6	8	3.2
Total	603	100.0	545	100.0	253	100.0

Automobiles Owned

This question was asked of owners only.

High	214	36.5	87	16.3
Medium	234	39.9	267	50.2
Low	121	20.7	158	29.7
No Car	17	2.9	20	3.8
Total	586	100.0	532	100.0

Education

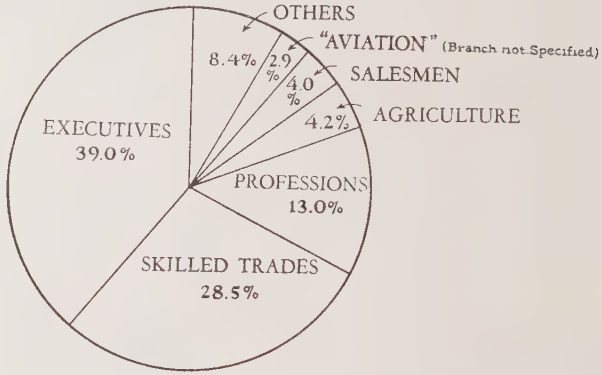
This question was asked students only. The standard of education of students in aviation is high. More than one-fourth are college graduates and more than three-fourths are high-school graduates or equivalent.

College graduates	67	26.9%
Entered college but not completed	23	9.2
Now college students	11	4.4
High-school graduates who did not attend college	89	35.8
Not high-school graduates	59	23.7
Total	249	100.0

OCCUPATIONS OF OWNERS

COMMERCIAL AND NON-COMMERCIAL COMBINED

PRESENT OCCUPATION

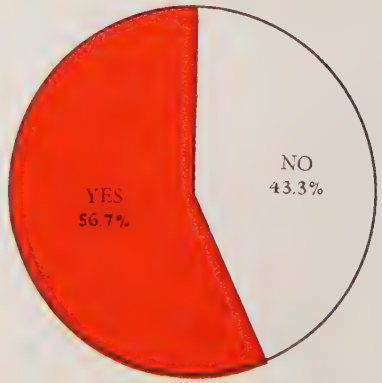


AVIATION DISTRIBUTOR OR DEALER

COMMERCIAL ONLY

GIVE FLYING INSTRUCTIONS

COMMERCIAL ONLY



APPENDIX F

OCCUPATIONS

Present Occupations

	Non-Commercial	Per Cent	Commercial	Per Cent	Students	Per Cent
Executives (including aviation)	222	39.2	208	38.7	44	18.4
Skilled trades (including aviation)	118	20.8	196	36.5	53	22.1
Professions (including aviation)	94	16.6	49	9.1	30	12.5
Agriculture	31	5.5	16	3.0	11	4.6
Salesmen A	30	5.3	15	2.8	19	7.9
Merchants	14	2.5	4	.7	8	3.3
Office (clerical)	10	1.8	6	1.1	24	10.0
Students	12	2.1	3	.6	23	9.6
Shopkeepers	7	1.2	6	1.1	6	2.5
"Aviation" (branch not specified)	6	1.1	26	4.8	12	5.0
Retired	6	1.1	..	..	1	.4
Public Service	5	.9	3	.6	2	.8
Unskilled labor	4	.7	1	.2	6	2.5
Transportation	2	.3	3	.6	..	..
Salesmen B	4	.7	..	..	1	.4
Housewives	1	.2	1	.2	..	..
Total	566	100.0	537	100.0	240	100.0

Do you act as distributor or dealer?

	Non-Commercial	Per Cent	Commercial	Per Cent
Yes	44	8.1	261	50.2
No	502	91.9	259	49.8
Total	546	100.0	520	100.0

Do you give flying instructions for profit?

	Non-Commercial	Per Cent	Commercial	Per Cent
Yes	9	1.6	301	56.7
No	553	98.4	230	43.3
Total	562	100.0	531	100.0

Aviation Interests of Non-Commercial Owners

Are you connected with the aviation industry? If so, in what capacity?

Where a questionnaire indicated that the primary use of plane was not in connection with the aviation industry, the questionnaire was tabulated as non-commercial. Of the 624 owners tabulated as non-commercial, 142 or 23 per cent indicated some connection with the aviation industry. The various aviation activities of the 142 are listed below.

	Non-Commercial	Per Cent	Commercial	Per Cent
Operators—Managers	67	47.2	175	43.3
Mechanics	26	18.3	16	4.0
Pilots	14	9.9	157	38.9
Aircraft Engineers	19	13.4	19	4.7
Teachers of Aircraft	3	2.1	9	2.2
Army Air Corps	4	2.8	1	.2
Others not specified	9	6.3	27	6.7
Total	142	100.0	404	100.0

APPENDIX G

FLYING AND MAINTENANCE BY OWNERS

Do You Fly the Plane?

More than 90 per cent of the owners fly their planes. A somewhat larger per cent in the lower income group fly their own planes.

NON-COMMERCIAL

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	558	90.9	163	86.7	117	92.1	250	98.0
No	56	9.1	25	13.3	10	7.9	5	2.0
Total	614	100.0	188	100.0	127	100.0	255	100.0

COMMERCIAL

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	488	90.4	37	84.1	119	86.9	298	95.2
No	52	9.6	7	15.9	18	13.1	15	4.8
Total	540	100.0	44	100.0	137	100.0	313	100.0

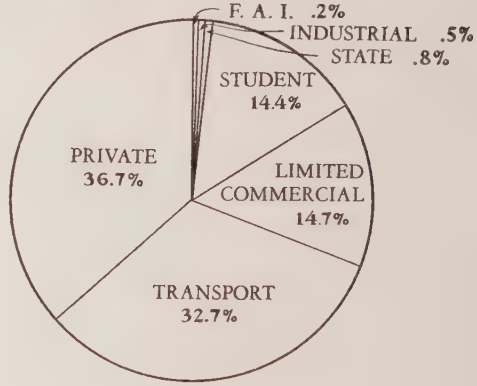
FLYING AND MAINTENANCE BY OWNERS

COMMERCIAL AND NON-COMMERCIAL COMBINED

FLY OWN PLANE

TYPE OF LICENSE

OF THOSE REPORTING LICENSE



EMPLOY PILOT

INCLUDING PART TIME

HANDLE OWN MAINTENANCE

Type of License

Type of license held by those who reported having license. The holding of a private license is much more general in the higher income group.

Non-Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Private	220	56.5	96	63.6	52	57.1	61	48.0
Transport	60	15.4	30	19.9	16	17.6	12	9.5
Limited Commercial	33	8.5	10	6.6	7	7.7	12	9.5
Student	73	18.8	14	9.3	15	16.5	42	33.0
State	2	.5	..	..	1	1.1	..	..
Industrial	1	.3	1	.6	..	..	..	..
F. A. I.	..	..	..	..	..	..	..	..
Total	389	100.0	151	100.0	91	100.0	127	100.0

Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Private	66	16.9	11	34.4	17	16.2	36	15.7
Transport	195	49.9	16	50.0	67	63.8	96	41.7
Limited Commercial	82	21.0	3	9.4	11	10.5	62	27.0
Student	39	10.0	2	6.2	7	6.7	30	13.0
State	4	1.0	..	..	1	.9	3	1.3
Industrial	3	.7	..	..	..	..	3	1.3
F. A. I.	2	.5	..	..	2	1.9	..	..
Total	391	100.0	32	100.0	105	100.0	230	100.0

Do You Employ a Pilot?

Non-Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	96	15.6	41	21.8	19	15.0	17	6.7
No	519	84.4	147	78.2	108	85.0	238	93.3
Total	615	100.0	188	100.0	127	100.0	255	100.0

Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	217	39.2	32	66.7	67	47.9	87	27.8
No	337	60.8	16	33.3	73	52.1	226	72.2
Total	554	100.0	48	100.0	140	100.0	313	100.0

Do You Handle Your Own Maintenance and Repairs?

Non-Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	300	49.2	35	18.4	55	44.4	193	76.0
Partially	82	13.4	22	11.6	20	16.1	32	12.6
No	228	37.4	133	70.0	49	39.5	29	11.4
Total	610	100.0	190	100.0	124	100.0	254	100.0

Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	318	57.4	16	32.6	60	43.2	214	68.4
Partially	73	13.2	7	14.3	21	15.1	42	13.4
No	163	29.4	26	53.1	58	41.7	57	18.2
Total	554	100.0	49	100.0	139	100.0	313	100.0

APPENDIX H

MISCELLANEOUS FACTS CONCERNING OWNERS

How is Plane Owned?

Three-quarters of non-commercial owners owned their planes individually.

	Non-Commercial	Per Cent	Commercial	Per Cent
Individual	497	79.0	411	54.6
Business Firm	56	8.9	267	35.4
More than one individual	54	8.6	63	8.4
Flying Club	22	3.5	12	1.6
Total	629	100.0	753	100.0

Was Make of Plane Chosen Upon Recommendation of School or Pilot?

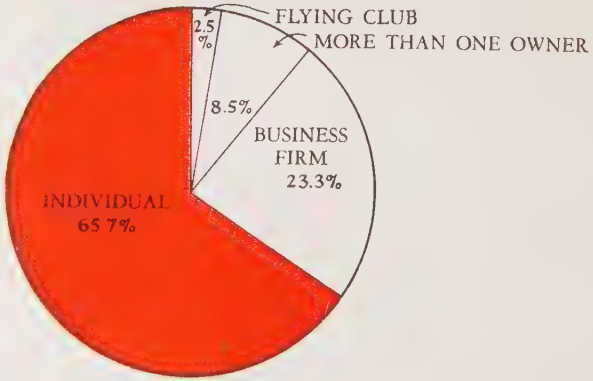
A substantial majority replied that neither school nor pilot determined make of plane.

	Non-Commercial	Per Cent	Commercial	Per Cent
Flying School	96	15.4	76	13.5
Pilot	123	19.7	82	14.5
Both	40	6.4	48	8.5
Neither	365	58.5	359	63.5
Total	624	100.0	565	100.0

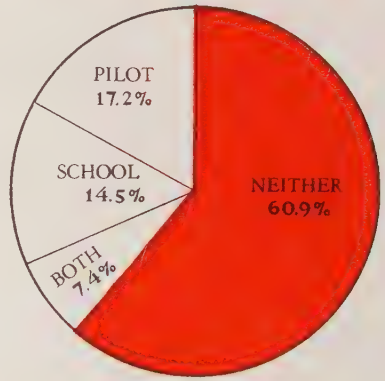
MISCELLANEOUS FACTS CONCERNING OWNERS

COMMERCIAL AND NON-COMMERCIAL COMBINED

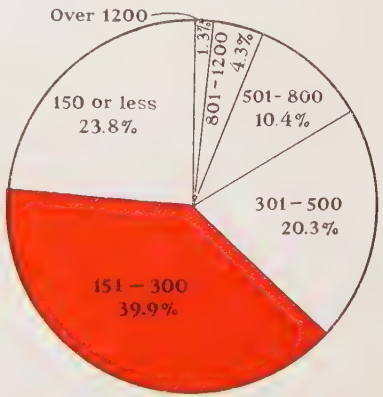
OWNERSHIP OF PLANE



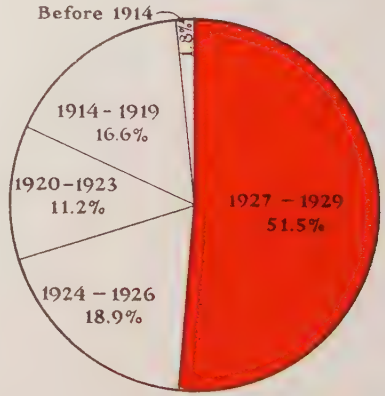
INFLUENCE IN SELECTION OF PLANE



HOURS PLANE IS USED ANNUALLY



LEARNED TO FLY



How Many Hours Used Annually?

A majority use the plane less than 300 hours annually.

	Non-Commercial	Per Cent	Commercial	Per Cent
150 hours or less	202	37.6	80	12.3
151–300 hours	221	41.2	252	38.8
301–500 hours	64	11.9	177	27.3
501–800 hours	30	5.6	93	14.4
801–1200 hours	19	3.5	32	4.9
Over 1200 hours	1	.2	15	2.3
Total	537	100.0	649	100.0

Owners in the lower income group use their planes less than those in the higher income group.

In What Year Did You Learn to Fly?

A substantial majority of non-commercial owners and more than 45 per cent of commercial owners have learned to fly in the past three years.

	Non-Commercial	Per Cent	Commercial	Per Cent
1927–1929	321	57.0	233	45.5
1924–1926	95	16.9	108	21.1
1920–1923	52	9.2	69	13.5
1914–1919	82	14.6	96	18.7
Before 1914	13	2.3	6	1.2
Total	563	100.0	512	100.0

APPENDIX I

STUDENT OWNERSHIP

Do You Own a Plane Individually?

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	16	6.3	8	23.5	3	6.0	4	2.5
No	236	93.7	26	76.5	47	94.0	154	97.5
Total	252	100.0	34	100.0	50	100.0	158	100.0

If Not, Do You Own a Part Interest in a Plane?

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	37	15.8	3	11.5	9	19.1	24	15.8
No	197	84.2	23	88.5	38	80.9	128	84.2
Total	234	100.0	26	100.0	47	100.0	152	100.0

If So, How Owned?

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Flying School	10	27.0	..	....	..	....	9	37.5
Corp. Member	11	29.7	3	100.0	3	33.3	5	20.8
Other Capacity	16	43.3	..	....	6	66.7	10	41.7
Total	37	100.0	3	100.0	9	100.0	24	100.0

If Ownership is Not Individual, Do You Plan to Buy Within Year?

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	83	36.3	18	66.7	19	42.2	45	30.4
No	107	46.7	7	25.9	18	40.0	79	53.4
Doubtful	39	17.0	2	7.4	8	17.8	24	16.2
Total	229	100.0	27	100.0	45	100.0	148	100.0

APPENDIX J

CONNECTIONS OF STUDENTS WITH AVIATION INDUSTRY

Do You Expect to Make Flying Your Exclusive Occupation?

Two-thirds of the students with incomes less than $5,000 and one-sixth of the students with incomes in excess of $10,000 expect to make aviation their exclusive occupation.

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Yes	129	51.4	6	17.1	16	32.0	104	66.7
No	103	41.0	26	74.3	32	64.0	41	26.3
Perhaps	19	7.6	3	8.6	2	4.0	11	7.0
Total	251	100.0	35	100.0	50	100.0	156	100.0

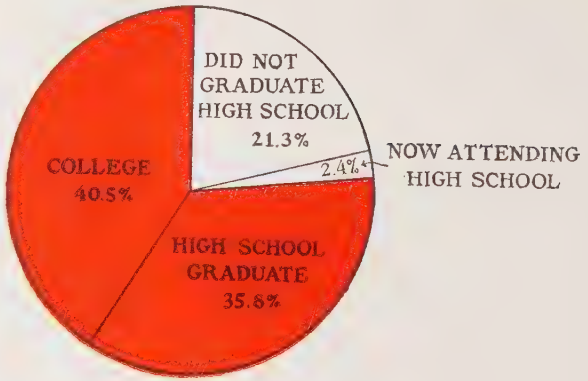
In What Capacity, If Any, Do You Expect to be Connected With Aviation as a Business?

Pilots accounted for the largest number with variations according to income groups.

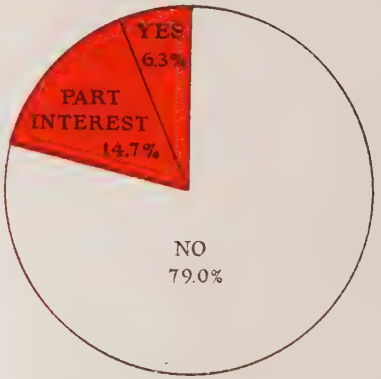
	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Pilot	82	44.3	2	11.1	8	25.0	67	52.8
Sales	34	18.4	5	27.8	7	21.9	21	16.5
Executive	29	15.7	6	33.3	10	31.2	12	9.5
Engineer	16	8.7	2	11.1	5	15.6	8	6.3
Mechanic	13	7.0	..	....	..	....	13	10.2
Instruction	8	4.3	..	....	2	6.3	6	4.7
Finance	3	1.6	3	16.7	..	....	..	....
Total	185	100.0	18	100.0	32	100.0	127	100.0

STUDENTS

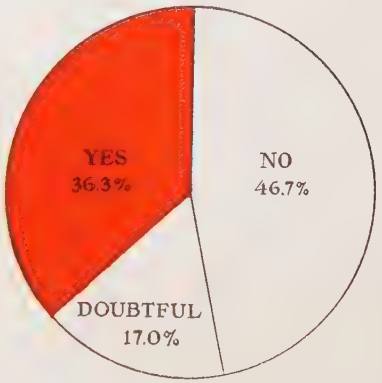
EDUCATION



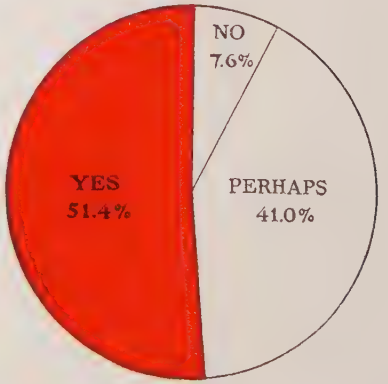
OWN PLANES



PROSPECTS
AMONG NON-OWNERS



EXPECT TO MAKE FLYING EXCLUSIVE OCCUPATION



If Not Planning to Enter the Aviation Industry, in What Other Business, if Any, Do You Expect to Use an Airplane?

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Pleasure only . .	31	39.2	12	46.2	6	37.5	12	36.4
Personal transportation and business . . .	35	44.3	9	34.6	7	43.7	18	54.5
Operate commercially.	3	3.8	..	....	1	6.3	1	3.0
Business and pleasure . . .	10	12.7	5	19.2	2	12.5	2	6.1
Total. . . .	79	100.0	26	100.0	16	100.0	33	100.0

Attitude of Relatives

Wife

More than three-fourths of the students report their wives as favorable. This probably signifies that some who met family resistance did not enter aviation.

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Favorable. . . .	82	87.2	15	78.9	26	86.6	38	90.5
Unfavorable. . .	9	9.6	4	21.1	2	6.7	3	7.1
Undecided . . .	3	3.2	..	....	2	6.7	1	2.4
Total. . . .	94	100.0	19	100.0	30	100.0	42	100.0

Parents

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Favorable. . . .	133	73.9	17	65.4	23	76.7	89	75.4
Unfavorable. . .	34	18.9	8	30.8	4	13.3	21	17.8
Undecided . . .	13	7.2	1	3.8	3	10.0	8	6.8
Total. . . .	180	100.0	26	100.0	30	100.0	118	100.0

USE TO WHICH AIRPLANE IS PUT

COMMERCIAL AND NON-COMMERCIAL COMBINED

COMMERCIAL AVIATION ONLY 23.9%
OTHER COMBINED USES 18.5%
COMMERCIAL & BUSINESS OR PLEASURE 25.2%
PLEASURE ONLY 22.2%
BUSINESS ONLY 5.3%
BUILDING TIME ONLY 4.9%

APPENDIX K

USE OF PLANE

For What Do You Use the Plane?

Non-Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Pleasure only	260	42.7	72	38.3	49	39.5	122	48.4
Commercial only	...	....	..	....	..	....	...	....
Business only*	62	10.2	25	13.3	11	8.9	9	3.6
Building time only	57	9.3	1	.5	6	4.8	46	18.2
Commercial and Pleasure or Business	14	2.3	3	1.6	3	2.4	7	2.8
Other combined uses*	216	35.5	87	46.3	55	44.4	68	27.0
Total	609	100.0	188	100.0	124	100.0	252	100.0

Commercial

	Total		$10,000 and Up		$5,000–$10,000		Less than $5,000	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Pleasure only	...	....	..	....	..	....	...	....
Commercial only	279	49.9	19	38.0	79	55.6	146	46.5
Business only*	...	....	..	....	..	....	...	....
Building time only	...	....	..	....	..	....	...	....
Commercial and Pleasure or Business	280	50.1	31	62.0	63	44.4	168	53.5
Other combined uses*	...	....	..	....	..	....	...	....
Total	559	100.0	50	100.0	142	100.0	314	100.0

*Other than commercial.

THE CURTIS PUBLISHING COMPANY

ADVERTISING DEPARTMENT

Independence Square

Philadelphia, Pennsylvania

FRED A. HEALY

Advertising Director

WILLIAM R. BOYD, *Manager*
Chicago
333 North Michigan Avenue

E. V. THOMPSON, *Manager*
New York
Lincoln Building
60 East 42nd Street

ARTHUR KOHLER, *Manager*
Philadelphia
Independence Square

MELVILLE H. SMITH, *Manager*
Boston
Merchants National Bank Building
30 State Street

HERBERT M. FAUST, *Manager*
Detroit
General Motors Building
3044 W. Grand Boulevard

M. H. BOYNTON, *Manager*
Cleveland
Union Trust Building
925 Euclid Avenue

MORTON S. BAILEY, *Manager*
San Francisco
First National Bank Building
1 Montgomery Street

CHARLES COOLIDGE PARLIN, *Manager*
Commercial Research, Philadelphia

RAY H. HAUN, *Manager*
Ladies' Home Journal Service, Philadelphia

THOMAS E. McLAUGHLIN, *Manager*
The Saturday Evening Post Service, Philadelphia

JAMES M. IRVINE, *Manager*
The Country Gentleman Service, Philadelphia

ALFONSO J. FERNANDEZ
Assistant to the Advertising Director

DATE DUE

GAYLORD

PRINTED IN U.S.A.

TL
552
.C8

Curtis Publishing
Company

THE AVIATION INDUSTRY

DATE	ISSUED TO

TL
552
.C8

WASHINGTON AND LEE UNIV LIBRARY
TL552 .C8
Curtis Publishi / The
3 5101 00114557 7